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INSTITUTE FOR DEFENSE ANALYSES

**Defense Cost Research
Projects and Plans, 2000**

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Matthew Schaffer

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PREFACE

The Institute for Defense Analyses (IDA) prepared this document as part of a project that is jointly sponsored by IDA's Independent Research Program and the Office of the Director, Program Analysis and Evaluation, in the Office of the Secretary of Defense (OSD).

Every year, OSD's Cost Analysis Improvement Group (CAIG) reviews the status of DoD's ability to estimate the costs of forces and weapons at the DoD Cost Analysis Symposium. Later, CAIG meets with representatives from selected government offices, Federally Funded Research and Development Centers, and military universities to discuss ongoing and planned cost studies at the IDA Cost Research Symposium. Following these gatherings, the CAIG prepares an analysis plan that focuses on the areas of cost research needing the most attention given upcoming acquisition decisions.

This document contains material related to that process for the 2000 cycle. Its purpose is to make the material available to those who participated in the 2000 IDA Cost Research Symposium, and for other purposes deemed appropriate by the Chairman of CAIG. The material has not been evaluated, analyzed, or subjected to formal IDA review.

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I. INTRODUCTION

Several Department of Defense (DoD) offices are responsible for estimating and monitoring the costs of defense systems and forces in support of planning, programming, budgeting, and acquisition decisions. For example, the Cost Analysis Improvement Group (CAIG) in the Office of the Secretary of Defense (OSD) provides independent cost estimates and reports on life-cycle costs of major defense acquisition programs (MDAPs) in Acquisition Category ID (see Reference [1]). Cost agencies in the cognizant defense components provide independent estimates for other MDAPs.

The OSD CAIG leads efforts by these and other offices and organizations to improve the technical capabilities of the DoD to forecast future costs. Near the beginning of each year, during the DoD Cost Analysis Symposium, the CAIG reviews the status of DoD's capabilities to estimate the costs of defense systems. Several months later, representatives from the offices and organizations that sponsor cost research meet at the IDA Cost Research Symposium to discuss ongoing and planned cost research projects. Following these two events, the CAIG prepares a plan that encourages those who conduct cost research to focus on areas of highest payoff in view of pending acquisition decisions.

This document contains material related to that process for the 2000 cycle. Chapter II presents OSD CAIG's assessment of the status of defense cost-estimating capabilities. Chapter III describes the IDA Cost Research Symposium held in May 2000 and presents summaries of the current and planned cost research projects at the offices and organizations that participated.

II. DEFENSE COST-ESTIMATING CAPABILITIES

In the first section of this chapter, we describe the tools available to evaluate the resource implications of changes in DoD force levels and to assess resource requirements for certain infrastructure categories. We also examine potential areas of research areas that could improve these cost-estimating capabilities.

In the second section, we review the major defense acquisition programs that are approaching cost reviews and discuss potential cost-research areas to support these reviews.

A. FORCES AND INFRASTRUCTURE

Each of the services and various branches of the OSD, especially the Office of the Director, Program Analysis and Evaluation (PA&E), annually review the resource requirements for current and projected forces and the infrastructure that supports these forces. These annual reviews look for deficiencies in various resource accounts that fund forces and infrastructure and result in major resource decisions that realign or increase service and defense agency program submissions, affecting billions of dollars of program activities across the Future Years Defense Plan (FYDP). As such, the services and PA&E require effective costing tools that can provide decision makers with accurate assessments of required resources to fund military and civilian pay and benefits and the operations and maintenance costs of military equipment and facilities.

Besides the annual reviews, there are other major reviews that examine potential reallocation of funds through changes in force levels or infrastructure. The Quadrennial Defense Review (QDR) offers a periodic reassessment of strategic defense requirements and their corresponding budgetary needs for forces, infrastructure, and modernization. The Committee on Roles and Missions conducted a similar review in the early 1990s, and a new administration could call for a similar review. Defense Base Closure and Realignment (referred to as BRAC) committees have been used in the past as a nonpartisan mechanism for deciding how to shrink DoD's vast installation holdings, and it is possible a new administration will request BRAC authority early in its tenure.

All these efforts are founded on detailed analysis of resource requirements, and as we begin efforts for the next QDR, it is worth taking inventory of our analytic abilities to support these reviews. This year's Cost Research Symposium focused on force and infrastructure modeling and discovered, to no one's surprise, that DoD has fairly good force cost-estimating tools but has far weaker ability to assess infrastructure costs.

The next two sections discuss current capabilities in infrastructure and force structure modeling, respectively, and how these tools might be improved or expanded.

1. Infrastructure Models

In 1991, PA&E sponsored an IDA study to establish an infrastructure taxonomy, based on a simple categorization of the numerous FYDP program elements. These definitions were used in the Bottom-Up Review and the last QDR, and continue to be a convenient mechanism for reviewing broad areas of DoD's infrastructure. More recently, a DoD working group developed a complementary, FYDP-based force structure taxonomy that identifies non-infrastructure programs with force structure categories. (We'll talk later about this new forces taxonomy.) This work has resulted in a review and revalidation of the infrastructure taxonomy and a realignment of program elements between forces and infrastructure that improves the connection between programming and budgeting activities. Both taxonomies will allow better linkage between program and QDR deliberations and the resulting changes in resource structures.

There are eleven infrastructure categories: force installations, communications and information infrastructure, science and technology program, acquisition infrastructure, central logistics, defense health program, central personnel administration, central personnel benefits programs, central training, departmental management, and infrastructure activities not elsewhere categorized. While most of these categories have been in existence for almost 10 years, our modeling of infrastructure resource requirements has been fragmentary at best. In fact, it is fair to say that the traditional approach to modeling infrastructure has been either to treat it as a factor of the forces supported or to use statistical techniques that attempt to capture changes in infrastructure components resulting from changes in force structure. Neither of these approaches adequately captures the true nature of infrastructure resource requirements.

New cost models are needed that build off the following two basic premises: (1) that infrastructure is truly separate from forces and (2) that necessary resources must

be based on requirements. In the next few paragraphs, we discuss two modeling efforts underway that have taken just such an approach.

a. Facilities Sustainment Costs

The Program Objective Memorandum FY2001-2005 Facilities Front End Assessment led by PA&E and the Office of the Deputy Under Secretary of Defense (Installations) [ODUSD(I)] initiated the development of a model that would try to estimate the annual costs of sustaining DoD's real property across the FYDP. Sustainment is one part of real property maintenance—the other part being restoration and modernization—and this model addresses only the costs to upkeep DoD's facilities (buildings, runways, piers, etc.) as opposed to replacing, adding, or restoring facilities.

Using an existing Army methodology as the basic approach, the model takes a macro view of the resources needed to sustain DoD's facilities. At its simplest, the model starts with approximately 400 cost factors that are based primarily on commercial benchmarks for estimating annual sustainment costs. The model then takes existing service-built real property inventory databases and generates quantities of the various facility types consistent with the 400 cost factors. The quantities are adjusted using service input to account for changes in sustainment requirements forecasted in the FYDP (e.g., base closures, new construction, and demolition). The adjusted quantities are then multiplied by the cost factors to derive annual estimates of sustainment costs.

The model is complicated by questions of maintenance and repair responsibilities and funding sources. By law, only the military departments can hold real property, but various defense agencies are responsible for facility upkeep of the properties they use. PA&E and ODUSD(I) worked with the services and defense agencies to develop a set of business rules that help sort out these complications.

While the model was not intended to provide budget-quality estimates of the costs to sustain a specific facility, it was hoped that the model could provide good program estimates of sustainment costs for a fairly large DoD claimant. And validation efforts at the claimant and active-duty service levels have been extremely close (within 1 to 2 percent) to service sustainment estimates. The tool is now being used to assess the sufficiency of sustainment budgets during program review.

b. Defense Health Program's Health Care Costs

Funding for the Defense Health Program (DHP) is currently \$16 billion per year, approximately \$11.5 billion of which is used for the delivery of health care. About \$7.4

billion goes toward in-house care delivered through the military treatment facilities (MTFs), and \$4.1 billion goes toward purchased care. The lion's share of purchased care funding goes to the TRICARE Managed Care Support (MCS) contracts (approximately \$3.5 billion), which provide HMO and network-like health-care benefits for active-duty military dependents and military retirees and their dependents. (A portion of the contracts also provide administrative support to the MTFs.)

A unique feature of the MCS contracts is that they are intended to supplement health care provided by the MTFs, which does not fit any commercial model for the delivery of health care. In an attempt to write contracts with built-in incentives for the MCS contractor to support MTF operations, the writers of the contracts developed extraordinarily complicated mechanisms to determine the contractor's reimbursement. When actual data were used to calculate the cost of the contract, it turned out that the government owed considerably more to the MCS contractors than was expected when the contracts were awarded. At the end of 1999, the total adjustment to the contracts was nearly half a billion dollars.

In 1999, PA&E initiated the task of modeling the MCS contracts. The prototype gave insight into the contract mechanisms and helped to identify the major reasons for the increases being experienced in the cost of the contracts. Future versions of the model will help predict health care costs and the contractor's reimbursement under the contract, support the budgeting process, and perform what-if scenarios. Future uses might also include analyses that would help optimize follow-on MCS contracts and identify optimal MTF utilization.

2. Force Structure Models

PA&E developed a new taxonomy of force structure that essentially divides DoD forces into three categories: expeditionary forces, homeland defense, and space. Each category is further subdivided. For example, depending on their primary mission area, expeditionary forces are assigned to one of the following subcategories: mobility, ground combat, sea control, air control, or strike. The intent of this taxonomy was to allow better linkage between strategic defense aims and the underlying resource allocations that support these aims.

Periodic reviews, such as the Program Review and the QDR, often examine resource implications of changes in force levels. There are two approaches to estimating the resource changes. The first takes a simple, macro view of the changes and makes

reductions in program elements across the FYDP, based on the percentage change in force levels. The Force Acquisition Cost System (FACS) is an example of this type of approach to estimating force-structure changes. The other approach tallies resource changes based on individual units making up the affected forces, applying cost factors to the changes in quantity.

Each service has developed its own model to examine cost implications of force-structure changes. These models—SABLE, FORCES, and EPA—generally do well in estimating the direct costs of downsizing active-duty and reserve forces.

PA&E's preferred model is the Force and Support Costing System (FSCS). The model takes as input changes in units by type (e.g., an Army division), along with a deactivation timeline, and translates them into reductions in personnel and equipment assets. These reductions are then multiplied by cost factors to determine the resource implications of fewer people and equipment. The model can account for reallocations of personnel and equipment to other active-duty and reserve units and calculates adjusted fill rates—the percentage of asset targets that are met by the revised inventories.

Efforts are underway to capture changes in facilities that would result from force structure changes. The model will take into account BRAC authority and will estimate changes in real property maintenance and base operating support accounts that result from changes in service-owned facilities. Other efforts are beginning to incorporate infrastructure cost savings, such as decreases in training and logistics services resulting from deactivation of military units. These efforts will require new analytic approaches to better capture the linkage between forces and infrastructure.

One area that needs new research and analytic approaches is addressing the effect of force-structure changes on Army logistics and administrative support units at echelons above divisions and corps. Often, the approach taken is to reduce these units in the same proportion as the reduction in Army divisions. But many of these units have missions that are essentially independent of the forces supported and are much more dependent on the theater commander's concept of operations. For example, maintenance and ammunition units would likely realize a similar percentage reduction as the forces cut. Military police, air defense, intelligence, and communications units, however, would not necessarily be reduced. Requirements for these units depend more on features such as threat size, threat location, critical assets needing defense, and in-theater communications infrastructure than on the number of forces moving into theater.

What is needed is an analytical structure that is mission- and scenario-focused to address requirements for these units. This is identical to the analytical paradigm recommended above for infrastructure categories, (i.e., tying infrastructure resources more closely to the underlying requirements rather than to the forces they support).

3. Conclusion

As stated in the opening to this section, and as is apparent from the ensuing discussion, DoD has fairly good modeling capabilities to address force-structure changes but weaker capabilities to assess infrastructure resource requirements. The force-structure models accurately capture direct costs of forces, but improvements to these models, as well as new methodologies, are needed to assess infrastructure resource implications. New methodologies would treat infrastructure categories separately from forces and would be based on requirements, such as the examples provided in the Infrastructure Models subsection.

B. WEAPON SYSTEMS

In support of the Defense Acquisition Board (DAB), The Cost Analysis Improvement Group (CAIG) provides independent cost estimates and reports on life-cycle costs for all major defense acquisition programs (MDAPs) in Acquisition Category (ACAT) ID and other selected acquisitions. Independent cost estimates for MDAPs in ACAT IC are done by the cost office or agency in the cognizant component. DoD policy, which expands on statutory language in Title X of the U.S. Code, requires independent estimates at all milestones beyond Milestone 0. On occasion, senior DoD officials ask the CAIG to prepare independent cost assessments for MDAPs in support of major program reviews between these milestones.

1. Current MDAPs and Upcoming Reviews

Figure II-1 shows a history of the number of MDAPs over the past 5 years. For the last 3 years, the number of MDAPs has stayed fairly constant at about 80 programs, roughly evenly split among the Army, Navy, and Air Force.

Figure II-2 shows the same programs aggregated by ACAT designation (IC or ID). The Under Secretary of Defense (Acquisition and Technology) has milestone decision authority (MDA) for ACAT ID programs, whereas the cognizant Component Acquisition Executive has MDA for ACAT IC programs. Figure II-2 also illustrates the

historical trend of total pre-MDAPs (i.e., programs the DoD expects to achieve MDAP in the future). The DoD tracks about 20 programs in a pre-MDAP state.

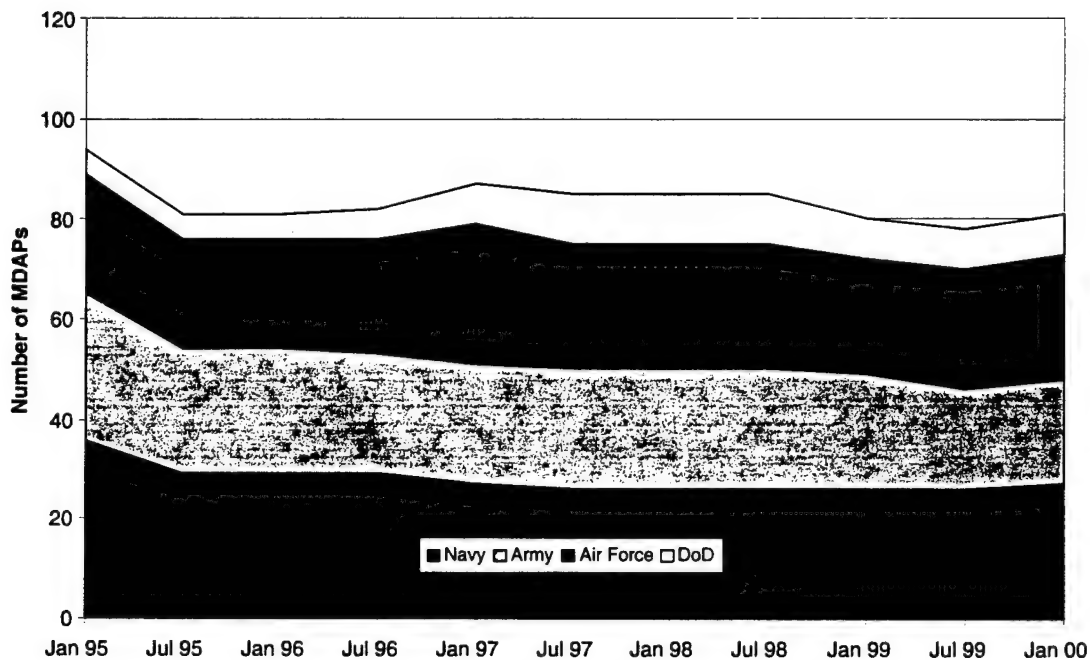


Figure II-1. MDAPs by Service as of January 2000

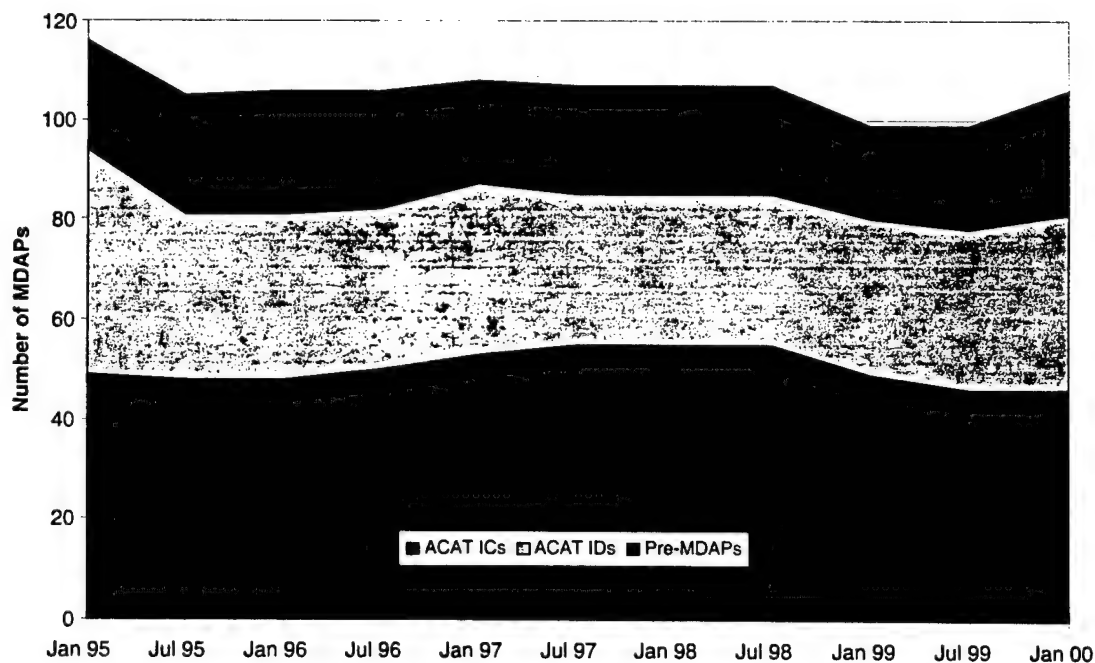
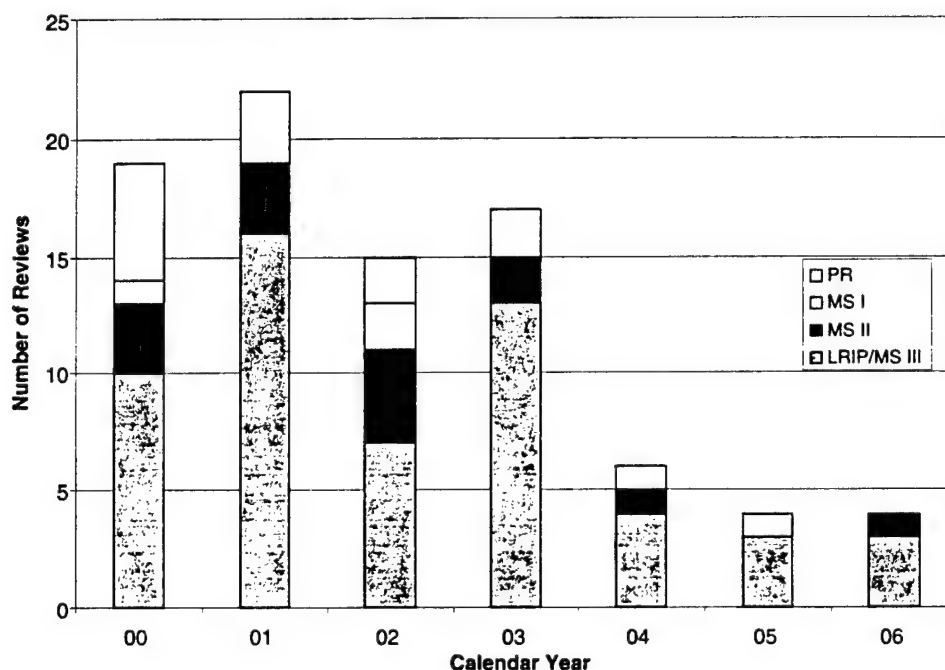


Figure II-2. MDAPs by Acquisition Category as of January 2000

Figure II-3 shows the numbers and types of reviews expected over the next 6 years. As implied by the note to the figure, the number of programs requiring cost reviews will grow as new programs enter the review process and existing programs experience cost overruns and schedule delays. Figure II-4 groups upcoming reviews into twelve commodity classes and shows the distinction between production reviews—those that correspond to low-rate initial production (LRIP) and Milestone (MS) III reviews—and pre-production reviews—Milestone I, Milestone II, or mid-milestone reviews.



Note: Most reviews after calendar year 2002 are not accounted for in this projection. These include Milestone I reviews for the current set of pre-MDAPS, Milestone I reviews for the next set of pre-MDAPS, and program reviews for troubled systems.

Figure II-3. Upcoming Reviews for ACAT IC and ID Systems by Phase

Figures II-3 and II-4 indicate a large number of programs are approaching production decision points. We focus on the programs coming up for pre-production reviews. There are two reasons for this choice. First, a review of historical cost growth in MDAPs shows that production cost estimates are more accurate than estimates for the research, development, test, and evaluation (RDT&E) phases of the program, even when measuring cost growth relative to Milestone II production estimates. Second, LRIP and MS III estimates are based, at least partially, on actual cost data for units produced in the engineering and manufacturing development (EMD) phase of the program. By contrast,

there are typically few or no actual program costs on which to base RDT&E estimates. Instead, estimators rely on statistical measures of analogous, historical program costs.

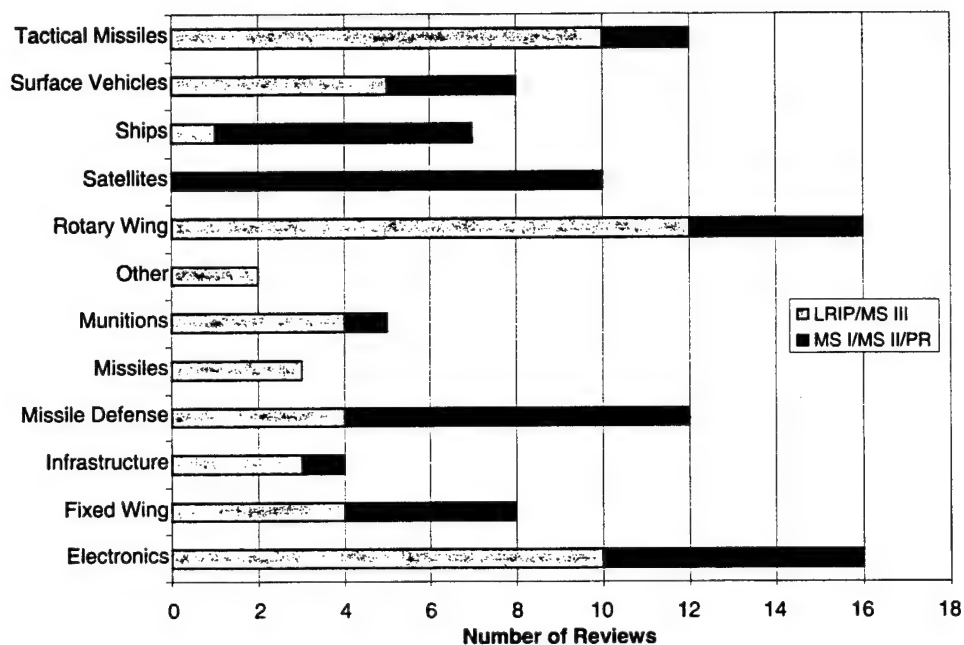


Figure II-4. Upcoming Reviews for ACAT IC and ID Systems by Commodity Class

2. Cost-Estimating Challenges

Figure II-4 reveals that most programs with upcoming pre-production cost reviews fall within one of the four following commodity groups: ships, satellites, missile defense systems, and electronics. The challenges posed for cost estimators in each of these four commodity areas are discussed in the subsections that follow.

a. Ships

The Navy has four new classes of ships in early phases of acquisition, DD-21, SSN-774, T-ADC(X), and CVN(X). The DoD is also discussing two other classes, JCC(X) and LHA(R), as possible new acquisitions. Naval shipbuilding is one of the last military-unique development areas. Cost-estimating relationships based on years of shipbuilding experience remain generally useful today. Affordability concerns for the new classes of Navy ships, however, are forcing the Navy to examine more extensive application of commercial production practices to naval shipbuilding. Such practices should be reviewed to ascertain which commercial practices naval shipyards can

implement and what cost implications may result. Estimators need to know what historical cost differences exist between commercial and military shipbuilding and how they might change with the adoption of commercial practices at a naval shipyard.

Five other areas of cost research would improve cost estimates of tomorrow's naval acquisitions-signature reduction, propulsion, manning reduction, teaming, and integrated process and product development (IPPD). Both the DD-21 and the CVN(X) require major development efforts to reduce radar cross-section and infrared, acoustic, and magnetic signatures. Estimators need to know what state-of-the-art processes are available for accomplishing such reductions, what processes are in development, and what costs are associated with applying such processes to naval ships.

The DD-21 and CVN(X) also have aggressive manning-reduction goals. Estimators need tools to evaluate the reasonableness of the projected manning levels, in terms of operational effectiveness and quality of life. These tools should help estimators understand necessary mixes of skill levels, new training requirements necessitated by the manning reductions, and the effects on shore-based support. A study on means and associated costs for manning reduction for analogous functions in the private sector would improve analysts' understanding of the applicability and effect of manning reductions on Navy ships.

The CVN(X) will have a new nuclear propulsion plant, and the DD-21 will have electric drive propulsion. The cost-estimating relationships for nuclear propulsion plants must be updated to reflect current technologies and new manufacturing processes, as well as their costs. Analysts will also need new tools to address the electric drive propulsion, a relatively new technology.

Teaming of the system integrator and the shipyards was first adopted for the LPD-17. That ship program was also the first to use IPPD teams, which originated in the aircraft industry. Expectations are that future classes of Navy ships will also be built by teams and incorporate IPPD. A review of the LPD-17 experience with teaming and IPPDs is called for to better understand the cost implications of such arrangements. Experience and practice by other industries would also provide useful insights.

b. Satellites

The Air Force has three programs now in Phase I of development:

- ◆ Space Based Infrared System Low Component (SBIRS Low),

- ◆ National Polar-orbiting Operational Environmental Satellite System (NPOESS), and
- ◆ Advanced Extremely High Frequency (AEHF) communication satellite system.

In addition, the Air Force is about to embark on a modernization program for the Global Positioning System (GPS) and is ready to start development of a wide-band gap-filler system to replace older Defense Satellite Communication System (DSCS) satellites.

The Navy is examining alternatives for its Mobile User Operational System (MUOS), a replacement for the Ultra High Frequency Follow-on (UFO) narrow-band satellite communication system.

Satellite systems generally have two major segments, space vehicles and ground support systems. The space vehicles are usually thought of as having two subsystems. One is the spacecraft (often called the "bus"), which provides electrical power, thermal dissipation, attitude control, and communications with the ground stations. The other is the payload. Most of DoD's satellite constellations are primarily space-based communications architectures. Thus, most payloads consist of antennas and processors to transmit and receive communications signals. On most other DoD constellations (GPS being the exception), as well as most intelligence systems, the payloads consist of specialized sensors for unique military and intelligence applications. The ground support systems are composed of (1) ground stations for communicating with and controlling the satellites and (2) facilities for processing the received signals. At a minimum, the ground stations provide command and control functions to monitor the health of the vehicle subsystems and to maintain the orbital integrity of the vehicles. For those systems with space-based sensors, the ground support system also includes a mission data processing function, which takes the raw sensor data collected by the satellite to produce intelligence, strategic, or tactical products that can take a variety of forms for distribution, such as messages or images.

Spacecraft costs have been and continue to be generally well understood. The cost-estimating relationships developed from numerous historical DoD and other government agency systems appear to capture adequately the costs of developing and building the spacecraft portion of a space vehicle. These relationships should be updated with more recent data. But, more importantly, the recent growth in the commercial satellite industry argues for a review of commercial practices and their applicability to defense satellite programs.

The three main cost research areas needed for satellite systems are for the ground support segments, communication payloads, and unique sensors. Like the new missile defense battle management systems, satellite ground support systems are software-intensive. Unlike them, however, ground support systems also have considerable hardware requirements for communicating with and controlling the satellite constellation; downloading and storing sensor data from the constellation; and processing, storing, and distributing these data and the resulting products. From a command and control perspective, the large constellations (in terms of the number of vehicles making up the constellation), such as GPS and SBIRS Low, have unique challenges that the smaller, geosynchronous constellations do not have, simply because the orbital ephemeris are far less complex for geosynchronous satellites. From a mission processing perspective, the relative uniqueness of the payload makes this portion of the ground support segment challenging to develop and estimate.

New databases must be developed, using data gathered from existing satellite ground support systems, for such development parameters as software size, commercial off-the-shelf content, hardware requirements, development schedule, and cost. Models based on these databases must account for leverage gained from predecessor satellite systems. For example, is productivity improved by modifying similar algorithms from previous or related systems, or is the effort equivalent to writing the new algorithm from scratch? What is the cost of integrating existing software modules into new software developments? The exponential growth in computer processing capability requires frequent re-hosting efforts to port old software onto new servers and desktop computers. What is the cost of this effort? How is obsolescence accounted for in the design and cost of ground support systems?

The bulk of DoD's future satellite acquisitions will be communication satellites. Each portion of the spectrum in which DoD operates satellite-based communication systems (wide-band SHF and Ka, protected EHF, and narrow-band UHF) will have replacement satellites launched within the next 8 years. Estimators need updated models for the communication payloads that incorporate not only DoD experience but also commercial experience. Such models should be sensitive to the degree of link protection required for the transmitted signals.

For the other DoD satellite acquisitions, new models are needed for the next generation of meteorological and infrared sensors, as well as new phased-array antennas for radio frequency-based sensors (e.g., GPS Modernization and the new Discoverer II

programs). Such models will likely include sensors found on non-DoD systems, such as those built for NASA, NOAA, and intelligence community applications.

c. Missile Defense Systems

The Ballistic Missile Defense Organization (BMDO) oversees acquisition of five MDAPs and one pre-MDAP for missile defense systems, all of which have milestone reviews approaching or recently held. All the systems are likely to have regular reviews—to include cost updates—between their major milestones. The systems are:

- ◆ National Missile Defense (NMD),
- ◆ Patriot Advanced Capability-3 (PAC-3),
- ◆ Navy Area Defense System (NADS),
- ◆ Theater High Altitude Area Defense (THAAD),
- ◆ Navy Theater Wide (NTW), and
- ◆ Medium Extended Air Defense System (MEADS).

The Air Force's Airborne Laser (ABL), another missile defense system, has a major review approaching in a few years, and the Space-based Laser (SBL) program continues to pursue technological developments that could lead to a future acquisition.

All of today's missile-based missile defense systems can be thought of as comprising three major subsystems: the interceptor; the sensor suite; and the battle management command, control, communications, and intelligence (BMC3I) suite. The generic hit-to-kill interceptor consists of a single- or multi-stage booster coupled to a kill vehicle front end. The kill vehicle includes a guidance section, often including a divert and attitude control system, and a seeker (usually an active radio frequency system or a passive infrared system, sometimes both) that make up the bulk of the interceptor cost. Sensor suites for these systems consist of fire-control radar operating somewhere in the super-high frequency (SHF) band of the radio spectrum. Such radar may also provide surveillance capability or may be supplemented with a separate surveillance radar system, generally operating in the ultra-high frequency (UHF) band. The BMC3I suites are complex, highly integrated architectures that blend largely commercial off-the-shelf hardware architectures and standard military communications suites with massive software programs that typically comprise multiple millions of lines of code.

The two areas of these missile defense systems that are particularly challenging to estimate are software embedded within the BMC3I system and the kill vehicles. Some of the BMC3I code is commercially available, some exists from previous developments, and

some requires new development. For cost-estimating purposes, analysts need a database that captures the baseline efforts and follow-on upgrades in terms of size (code count), productivity (lines of code delivered per development hour stratified by application type), schedule, and other metrics. Estimators need relationships that can predict software size, coding productivity and schedule as a function of the complexity (generally correlated to the software functionality), and integration extent (generally correlated to the number of external and internal interfaces for each major software item).

The kill vehicles for hit-to-kill interceptors (all but the NADS missile) appear to be significantly more challenging (and, therefore, costly) to design and build than predecessor missiles that relied on proximity-fused warheads. Recent cost analyses of the PAC-3 development and recurring costs show that existing interceptor cost models would underestimate the development costs by 50 percent and the production costs by 30 percent. Using the same cost models, predictions for the THAAD EMD interceptor would have been 25 percent too low when compared to predictions based on actual costs. And the NMD interceptor has cost 4 to 10 times what the models predicted.

Estimators need updated vehicle guidance (including the divert and attitude control system) and seeker models that incorporate the latest cost information from the new systems and an understanding of the cost drivers that make today's hit-to-kill seekers more expensive. This year, the CAIG, the NMD Joint Program Office, the Army's Space and Missile Defense Center, and the Navy Surface Warfare Center began a cooperative effort to update the interceptor cost models. Sharing data and resources, these organizations hope to develop improved estimating tools that can be used on future estimates, to include the NTW, MEADS, and sea-based NMD programs in the near future.

A third area in missile defense that requires new research is high-energy laser systems. When the CAIG developed the Milestone I estimate for the ABL, few analogies were available, and those that did exist were exclusively ground-based laser systems. New cost-estimating relationships are needed for the multi-megawatt lasers anticipated for airborne and space-based laser architectures. Estimators also need a firmer understanding of the key cost drivers for such systems.

d. Electronics

DoD has several major acquisitions underway (or plans for such) that will improve existing radar performance, provide better information management and

command and control, upgrade aircraft avionics, or introduce new communication suites. The systems include:

- ◆ Joint Tactical Radio System (JTRS),
- ◆ Warfighter Information Network-Tactical (WIN-T),
- ◆ Joint STARS Radar Technology Insertion Program (RTIP),
- ◆ modernization upgrades to GPS user equipment, and
- ◆ avionics modernization program for the C-130.

These systems share a reliance on advances in electronics technology that are primarily driven by commercial applications of the same or similar technologies.

Programs in this commodity group generally attain MDAP status in one of two ways: (1) the program comprises a large, expensive sensor to be integrated into a few platforms of a single type or (2) a relatively inexpensive electronic component (i.e., a circuit card or terminal) must be installed into a large number of platforms of many types. Both program types have common features, such as the development and manufacturing of new functional hardware—often referred to as Group B hardware—and the design and manufacture of installation kits—often referred to as Group A kits. The latter consist of items such as structures or templates necessary for installing the Group B hardware and new cable harnesses for linking the new hardware with platform power supplies and mission computers.

But the two program types differ significantly in their management structure. For large sensor programs, typically a single program manager is responsible for the design, development, and manufacture of the new functional hardware, as well as the installation and test and evaluation of the sensor with the platform. All programmatic activities are orchestrated by and funded through this single manager. RTIP is an archetype.

For smaller electronic systems, a single program manager is responsible for development and manufacture of the electronic component (Group B) only. But installation, integration, and test and evaluation are the responsibility of individual platform program offices. Thus, funds and programmatic activities associated with the Group B hardware flow through the single program office, whereas funds for the installation nonrecurring and recurring expenses must be provided to multiple program offices, which are often strewn across all services. Installation expenses usually represent the majority of the acquisition costs for the program. GPS-user equipment is an archetype here.

Estimators need new models for understanding the costs associated with the integration, installation, and test and evaluation efforts for both types of programs. For those electronics systems that will be installed on a large number of platform types, estimators need methods for narrowing the universe of platform types to a manageable subset that can serve as useful analogies for platform types with similar integration, installation, and test and evaluation costs.

The trend in inexpensive replacement electronic components is toward form-fit-function circuit cards with the same functionality in considerably less volume. Systems that use functions such as GPS are likely to move even more toward embedding that functionality into the larger subsystems rather than linking the functionality via data busses as is currently done. Despite the low costs of such electronic components, errors in recurring cost estimates are magnified simply because of the large procurement volume. Thus, estimators also need new tools that reflect the rapid advancements in and miniaturization of digital and radio frequency electronics. What are the fundamental phenomena behind these advances and what are appropriate tools for predicting prices of future electronics?

3. Other Issues for Cost Estimators

Analysis of cost growth in DoD programs demonstrates that estimating research and development (R&D) program phases is challenging. Many of the tools cost analysts use for estimating development costs can be characterized simply as a factor of the production costs. Because both the factor and the production estimate have some uncertainty, it is obvious that the R&D cost variance from such models is considerably larger than the production estimate variance. In a sense, cost estimators have compounded the error in their R&D estimates by using such models.

Cost estimators are also criticized for not being able to capture cost reductions resulting from new development and manufacturing processes and better business practices in their R&D estimates. Since the tools analysts use are primarily statistical analyses of historical programs, models will always lag improvements in such processes. To get better, estimators may need to break from such history-based tools and develop new models that provide better insight into the underlying processes that drive costs.

Is it possible, for example, to build a model for R&D that captures the interrelationships among the various tasks associated with a development effort? Such tasks would be grouped into broad categories, such as hardware design, software

development, recurring hardware build, system test and evaluation, systems engineering and program management. Each task then would have an underlying distribution associated with it that characterized the length of time needed to complete the task and a measure of the labor requirements as a function of time. The model also would capture the interdependence of each task with completion of predecessor and concurrent tasks.

Such a process-oriented model could be used in a number of analyses besides building a cost estimate. It could prove useful as a risk tool to assess schedule and cost implications for those tasks with significant technical risk. It could provide a mechanism for testing the efficiency of a spending profile, possibly providing an analytically based alternative program and spend plan to compare to a less efficient, resource-constrained program. Such an analysis would, thereby, address acquisition cycle-time issues prior to program initiation. The model could also be used to test claims of cost reduction by measuring the cost effects of changes in the interdependence, length, and overall costs of individual tasks brought about by changes in development processes.

Another topic of growing interest, given the push to maximize use of commercial products in DoD acquisitions, is the issue of obsolescence. How does the rapid pace of technological advances (both in hardware and software) affect programs with acquisition cycle times significantly greater than the obsolescence period (which is true for almost all MDAPs)? Does the notion of an "open-system architecture" accurately capture what happens in today's development efforts, in the sense that programs can readily adopt new commercial developments within the systems architecture? What are the costs associated with maintaining interfaces with constantly changing commercial products? Is the cost of keeping current less than the cost of obsolescence?

Integration and testing costs typically are estimated using factors that are based on costs of prime mission equipment or some other subset of development or procurement costs. But factors fail to capture the added complexity of the integration task for a system of systems; they do not consider the growing application of open architectures, address the increased dependency on software, or represent the expanded reliance on automation and simulation; and they ignore layering effects resulting from lead integrators being separate from prime equipment vendors. In addition, these efforts typically show strong time dependencies that are not captured through a factor approach.

Efforts should be undertaken to collect and analyze integration and testing cost data to understand the nature and scope of associated tasks, to determine cost drivers, and to develop estimating tools that consider features such as hardware costs, software size,

program duration, number of test sites and facilities, frequency of test events, and duration of test and evaluation effort.

Because time often plays a considerable role in determining the total development costs, estimators need tools that can address the time variable with better accuracy. Schedule estimating relationships (similar to CERs but with time as the dependent variable), time-based CERs, and methods of capturing system engineering and program management costs as a function of time (as well as prime mission equipment) are needed.

Other potential research topics include:

- developing methodologies to account for leveraging and other historical experience, often claimed by contractors as rationale for proposing costs below those estimated from historical costs;
- replacing step downs (from EMD recurring to production recurring) with models of EMD investments in producibility; and
- examining budget profile effects on program cost, perhaps leading to tools that would determine optimal expenditure profiles.

4. Conclusion

All the analysis topics discussed in this chapter focus on cost issues. Topic selection was guided by imminent projects, not all of which will maintain their schedules but ultimately will face milestone reviews. Often the topics were general enough to apply to many similar programs that the CAIG and other cost agencies will have to review in the coming years.

The analysis requirements, however, have a slightly different feel than previous cost analysis efforts, which have typically centered on construction of cost-estimating relationships using statistical tools. Such analyses will continue to be needed and, therefore, will need updating with newer data. But we are proposing a more ambitious undertaking, asking analysts to dig deeper and attempt to gain insight into program cost drivers, especially for R&D efforts. Such analyses will require different analytical tactics, such as thorough reviews of individual programs, detailed surveys conducted with contractors and government program offices, and different analytic tools. Success in this endeavor may be more elusive than with traditional cost analyses, but almost certainly cost estimators will gain an improved ability to evaluate programs and their costs and decision makers will gain cost estimates and related analyses to make better informed programmatic and resource decisions.

III. IDA COST RESEARCH SYMPOSIUM

On May 25, 2000, representatives from offices that sponsor defense cost research met at IDA to discuss and exchange information on their current research programs. The symposium, jointly sponsored by the OSD CAIG and IDA, has been held every year since 1989 (see References [2 through 13]).

A. AGENDA AND PARTICIPANTS

Table III-1 is the agenda for the 2000 symposium, and Table III-2 lists the offices and organizations that were invited to participate along with the names of the people who represented them this year.

Table III-1. Agenda

<i>Welcome-Dr. Stephen J. Balut, IDA</i>
<i>Keynote Address-Dr. David L. McNicol, OSD CAIG</i>
DoD Force and Infrastructure Costing Capabilities
<i>Introductory Remarks-Dr. Stephen J. Balut, IDA</i>
<i>OSD-Mr. Donald Tison, OSD CAIG</i>
<i>Army-Mr. Robert Bishop, CEAC</i>
<i>Navy-Mr. Leonard Cheshire, NCCA</i>
<i>Air Force-Col. Gene Johnson, AFCAA</i>
DoD Weapon Systems Costing Capabilities
<i>Update of 1999 Report-Mr. Matthew Schaffer, OSD CAIG</i>
<i>Roundtable Discussion, What Issues Will Play in the QDR?-Dr. McNicol, OSD CAIG</i>
<i>PA&E Force and Support Costing System-Mr. Lance Roark, OSD CAIG</i>
<i>Army Service-Based Costing-Mr. Stephen Bagby, CEAC</i>

Dr. David McNicol, Chairman of the OSD CAIG, presented the keynote address, setting the tone and challenging participants. Following that, presenters described the current capabilities of defense cost analysts to estimate the costs of defense forces and infrastructure. Separate assessments were presented by OSD CAIG, Army, Navy and Air Force representatives. Then, Mr. Matthew Schaffer, an OSD CAIG analyst, presented an update to the assessment of DoD's capabilities to estimate the costs of defense weapon

systems that was presented at the 1999 symposium (see Reference [13]).¹ Following that, Dr. McNicol led a wide-ranging discussion of issues that are expected to be important during the upcoming Quadrennial Defense Review (QDR). The afternoon concluded with presentations that described two high interest force and support costing capabilities that will be used during the QDR.

Table III-2. Participants in the 2000 IDA Cost Research Symposium

Office/Organization	Abbreviation	Representative
Office of the Director, Program Analysis and Evaluation	PA&E	Dr. David L. McNicol
Ballistic Missile Defense Organization	BMDO	Mr. Lowell Neaf
Army Cost and Economic Analysis Center	CEAC	Mr. Robert W. Young
Army Materiel Command	AMCRM	Mr. Kenneth F. Freund
Army Tank-automotive and Armaments Command	TACOM	Mr. Richard S. Bazzy
Army Aviation and Missile Command ^a	AMCOM	Mr. Frank T. Lawrence
Army Space and Strategic Defense Command	SMDC	Mr. Jackson G. Calvert
Naval Center for Cost Analysis	NCCA	Capt. Christopher Owens
Office of Naval Research	ONR	Ms. Katherine Drew
Naval Air Systems Command	NAVAIR	Mr. Ronald J. Rosenthal
Naval Sea Systems Command	NAVSEA	Mr. Mitchell Waldman
Naval Surface Warfare Center, Dahlgren Division ^a	NSWCDD	Mr. Alan Glazman
Naval Surface Warfare Center, Carderock Division	NSWCCD	Mr. Robert R. Jones
Air Force Cost Analysis Agency	AFCAA	Mr. Joseph T. Kammerer
Aeronautical Systems Center, Air Force Material Command	ASC/FMC	Ms. Kathy Ruffner
Air Force Space and Missile Systems Center	AFSMC	Mr. Anthony E. Finefield
Electronics Systems Center, Air Force Material Command ^a	ESC/FMC	Col. Ron Phillips
Ministry of Defence, Special Procurement Services/ Cost Forecasting	SPS/CF	Mr. Brian Avery
Air Force Institute of Technology ^a	AFIT/ENG	Dr. Roland Kankey
Defense Systems Management College ^a	DSMC	Ms. Siobhan Tack
Aerospace Corporation	AERO	Dr. Steven Glazeman
MITRE Corporation	MITRE	Mr. Paul Garvey
RAND Corporation	RAND	Mr. Frederick S. Timson
Center for Naval Analyses	CNA	Dr. Matthew Goldberg
Institute for Defense Analyses	IDA	Dr. Stephen J. Balut

^a These five offices/organizations did not submit project summaries this year.

¹ Information from these presentations form the basis for the assessment of defense cost-estimating capabilities in Chapter II of this document.

B. ONGOING AND PLANNED COST RESEARCH STUDIES

At IDA's request, participants prepared summaries of ongoing and planned cost research studies at their offices and organizations. These were supplied to IDA for use at the symposium and in this document.

1. Study Titles

The titles of the studies listed here are grouped according to the office or organization performing the study and are arranged in the order they were submitted to IDA. We assigned each title a number (e.g., PA&E-1) using the office/organization abbreviations listed in Table III-2.

Office of the Director, Program Analysis and Evaluation

PA&E-1	Force and Support Cost (FSC) System
PA&E-2	Visibility and Management of Operation and Support Costs (VAMOSOC) for Major Weapon Systems
PA&E-3	O&M Program Balance and Related Cost Drivers
PA&E-4	Facilities Assessment Database (FAD)
PA&E-5	Reducing Defense Infrastructure Costs
PA&E-6	Selected Acquisition Report (SAR) Cost Variance Analysis
PA&E-7	Cost Estimating in New Manufacturing Environments
PA&E-8	IDA Cost Research Symposium
PA&E-9	Understanding the Sources of Cost Growth
PA&E-10	Cost of Developing and Producing Next Generation Tactical Aircraft
PA&E-11	Contractor Cost Data Reporting (CCDR) Clearinghouse/Repository
PA&E-12	Aircraft Production Support Labor Cost Study
PA&E-13	Analysis of Customer-Provider Program Balance for Defense Working Capital Funds (DWCF)

Ballistic Missile Defense Organization

BMDO-1	Development Phase CERs
BMDO-2	BMDO Cost Risk Research
BMDO-3	Cost Driver Analysis/Technology Insertion
BMDO-4	Time Phasing Algorithms for Prototype Manufacturing and Development Engineering
BMDO-5	Fixed Site Early Warning Radar
BMDO-6	Learning Slope, Production Rate Effect and the Prototype to Production Step-Down Factor
BMDO-7	Evaluation of the TBMD Missile Model
BMDO-8	Production Phase SEPM
BMDO-9	BMDO Operating & Support Cost Estimating
BMDO-10	Ad-Hoc Analysis

Army Cost and Economic Analysis Center

CEAC-1	Operating and Support Management Information System (OSMIS) Data Base Management
CEAC-2	Operating and Support Management Information System (OSMIS) Output Products
CEAC-3	ACEIT Help-Desk
CEAC-4	ACEIT Enhancements
CEAC-5	ACDB Sustainment and Enhancements
CEAC-6	Communications and Electronics Cost Data Base/Methodology
CEAC-7	Army Tri-Service Missile and Smart Munitions Database
CEAC-8	Wheel and Tracked Vehicle Data Base and Methodology Development
CEAC-9	Aircraft Module Data Base and Cost Estimating Relationship (CER) Development
CEAC-10	ACEIT Standard Applications Interface
CEAC-11	ACEIT FSCS O&S Cost CAIV
CEAC-12	Cost Management & ABC Implementation
CEAC-13	Installation Status Report (ISR) Part I, AIM-HI Cost Factors
CEAC-14	Installation Status Report (ISR) Standard Service Cost (SSC) Part III
CEAC-15	Civilian Costing System
CEAC-16	Force and Contingency Cost Models Update

Army Materiel Command

AMCRM-1	ACE-IT Verification and Validation Tool
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Army Tank-automotive and Armaments Command

TACOM-1	Hercules Total Ownership Cost Reduction (TOCR) Model
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Army Aviation and Missile Command

No input submitted.

Army Space and Strategic Defense Command

SMDC-1	Updated Ground Based Radar Independent Cost Model
SMDC-2	Strategic Missile Model Update
SMDC-3	Strategic and Experimental IR Sensor Cost Model III
SMDC-4	Update Rocket Motor/Propulsion Cost Estimating Relationship
SMDC-5	Inertial Measurement Unit (IMU) Cost Resource Data Book
SMDC-6	Interceptor Control Surface Cost Estimating Relationship

Naval Center for Cost Analysis

NCCA-1	Ship and Shipboard System Operating and Support Cost Analysis Model (OSCAM-Ship, OSCAM-Sys)
NCCA-2	Aircraft Operating and Support Cost Analysis Model (OSCAM-Air)
NCCA-3	Avionics Operating and Support Cost Analysis Model (OSCAM-Air Sys)
NCCA-4	Advanced Amphibious Assault Vehicle (AAAV) Operating and Support Cost Analysis Model (OSCAM-AAAV)

NCCA-5	Cost of Manpower Estimating Tool (COMET v2.0)
NCCA-6	Naval VAMOSOC Database
NCCA-7	Integrated Detailed Total Operating and Support Cost Database
NCCA-8	COTS Electronics Acquisition Cost Impact Factors
NCCA-9	Platform Integration Cost Database/Model for Electronics
NCCA-10	MILSPEC Electronics Acquisition Cost/Technical Database
NCCA-11	Weapon System Software Development Cost/Technical Database
NCCA-12	Weapon System Software Development Estimating Methodology
NCCA-13	Weapon System Software Maintenance Cost/Technical Database and Estimating Methodology
NCCA-14	Automated Information System (AIS) Software Cost/Technical Database and Estimating Methodology

Office of Naval Research

ONR-1	Uncertainty Calculus to Minimize Total Ownership Costs for Ships
ONR-2	Affordability Measurement and Prediction Methods to Support Affordable Design of Ship Systems
ONR-3	Technology Insertion Cost Estimation Comparison for Aircraft Carrier Systems
ONR-4	Research in Affordability Measurement and Prediction Methods to Support Affordable Design of Ship Systems
ONR-5	Marine Composites Affordability—A Knowledgebased Approach
ONR-6	Composites Affordability Initiative Cost Analysis Tool (CAICAT)
ONR-7	Effect of New Technologies on Ship Systems: A System Dynamics Cost Modeling Approach

Naval Air Systems Command

NAVAIR-1	Affordable Readiness Cost Model
NAVAIR-2	SLAP/SLEP Full Scale Testing Model
NAVAIR-3	Demilitarization/Disposal Model
NAVAIR-4	Aging Aircraft Study Cost Update
NAVAIR-5	Cost Growth Analysis
NAVAIR-6	Naval Aircraft Modification Model (NAMM) Update
NAVAIR-7	Force Level Economic Effectiveness Trade (FLEET) Model
NAVAIR-8	Engineering Investigations Cost Model (EICM)
NAVAIR-9	Avionics Database
NAVAIR-10	Rotary Wing Database
NAVAIR-11	Propulsion Database
NAVAIR-12	Environmental Costs of Hazardous Operations (ECHO) Model
NAVAIR-13	Analysis of Alternatives (AOA) Evaluation Tool
NAVAIR-14	Missile Database

Naval Sea Systems Command

NAVSEA-1	Material Vendor Survey
NAVSEA-2	CVNX Total Ownership Cost Database, Model, and Process Development
NAVSEA-3	Theater Surface Combatant (TSC) Technology Refresh Cost Model
NAVSEA-4	"System of Systems" Technology Refresh Cost Model

NAVSEA-5 Technology Assessment and Management (TeAM) Cost Analysis

Naval Surface Warfare Center, Dahlgren Division

No input submitted.

Naval Surface Warfare Center, Carderock Division

- NSWCCD-1 Product-Oriented Design and Construction (PODAC) Cost Model
- NSWCCD-2 Navy Force Affordability Model (NFAM)
- NSWCCD-3 Aircraft Carrier Technology Economic Analysis Model (TEAM)
- NSWCCD-4 LEAPS Cost Support

Air Force Cost Analysis Agency

- AFCAA-1 ACE-IT/COSTAT Enhancements
- AFCAA-2 ACDB Improvements
- AFCAA-3 Military Aircraft Data and Retrieval (MACDAR) System Update
- AFCAA-4 NAFCOM (NASA/Air Force Cost Model)
- AFCAA-5 ACDB Missile Database Improvements
- AFCAA-6 Air Force Total Ownership Cost (AFTOC)
- AFCAA-7 Independent Verification and Validation (IV&V) of the Air Force Total Ownership Cost (AFTOC) System
- AFCAA-8 Defense Contractor Overhead Rate Analysis
- AFCAA-9 Air Force Inflation Model Tool
- AFCAA-10 Aircraft Avionics Systems Database and Study
- AFCAA-11 Joint Automated Information System (AIS) Automated Cost Database (ACDB) Framework
- AFCAA-12 Missile Cost Estimating Relationship (CER) Development
- AFCAA-13 Crosslink Payloads Data Collection and CER Development
- AFCAA-14 Wartime Cost Per Flying Hour Analysis
- AFCAA-15 Force Analysis Decision Support System (FADSS) (ACE-IT Enhancements)
- AFCAA-16 COTS Electronics Database/Modeling
- AFCAA-17 Phased Array Cost Database
- AFCAA-18 Commonality/Heritage Study
- AFCAA-19 Sable Contingency Model
- AFCAA-20 AFI 65-503 Database Model
- AFCAA-21 Air Force Planning and Projection (AFPP) Database
- AFCAA-22 Knowledge Management

Aeronautical Systems Center, Air Force Materiel Command

- ASC/FMC-1 Avionics Production Cost Factor Study
- ASC/FMC-2 Automated Model for Integrating Cost Analysis with Operational Effectiveness Analysis

Air Force Space and Missile Systems Center

- AFSMC-1 FY98 Passive Sensor Cost Model Update
- AFSMC-2 FY98 Unmanned Spacecraft Cost Model (USCM) Update

Electronics Systems Center, Air Force Material Command

No input submitted.

Ministry of Defence, Special Procurement Services/Cost Forecasting

SPS/CF-1 Software Support Cost Model Project (SSCMP)

Air Force Institute of Technology

No input submitted.

Defense Systems Management College

No input submitted.

Aerospace Corporation

AERO-1 Costs of Space, Launch, and Ground Systems
AERO-2 Small-Satellite Subsystem Cost Model
AERO-3 Ground Systems Cost Model
AERO-4 Concept Design Center
AERO-5 Instrument Cost Model
AERO-6 Production Cost Anthology
AERO-7 Space-based Optical Instrument Cost Model

MITRE Corporation

MITRE-1 C4ISR Investment Strategies
MITRE-2 A Decision-Logic Tree and Economic Model to Assess the Costs and Benefits
 of Seat Management Outsourcing
MITRE-3 Integrating the Balanced Scorecard with Decision Analytics to Support IT
 Investment Decisions

RAND Corporation

RAND-1 Force Structure and Support Infrastructure Costing for Program Analysis and
 Evaluation
RAND-2 The Cost of Future Military Aircraft: Historical Cost Estimating Relationships
 and Cost Reduction Initiatives
RAND-3 Understanding the Sources of Cost Growth in Weapon Systems

CNA Corporation

CNA-1 Restructuring DoN FYDP Program Elements
CNA-2 Acquisition Management Analysis
CNA-3 Military Hospital Cost Analysis
CNA-4 Economic Analysis of the Smart Card
CNA-5 Supply Readiness and Cost
CNA-6 Support for QDR 01: Strategy of Balance
CNA-7 Assessing and Monitoring Utility Privatization

Institute for Defense Analyses

IDA-1	Assessment of CCDR System
IDA-2	Economic Drivers of Defense Overhead Costs
IDA-3	Assessment of BMDO Cost Estimation Methodology and Cost Control/Cost Reduction Initiatives
IDA-4	Methods to Assess Schedules for the Strategic Defense System
IDA-5	Costs of Developing and Producing Next Generation Tactical Aircraft
IDA-6	Cost of Stealth
IDA-7	Costs & Benefits of Installation of Flight Safety Systems on F-22 Aircraft
IDA-8	Cost and Benefits of Raising the Micro-Purchasing Dollar Threshold
IDA-9	Support to F-22A Aircraft Production Readiness Assessment
IDA-10	Technical and Schedule Risk Assessments for Tactical Aircraft Programs
IDA-11	Affordable Multi-Missile Manufacturing (AM3)
IDA-12	Portfolio Optimization Feasibility Study
IDA-13	Resource Analysis for Operational Test and Evaluation (OT&E)
IDA-14	Resource Analysis for Test and Evaluation—MRTFB
IDA-15	Contingency Operations Support Tool (COST)
IDA-16	FYDP-Related Studies
IDA-17	Defense Resource Management Cost Model
IDA-18	Major Defense Acquisition Program (MDAP) Analysis and FYDP Support
IDA-19	Defense Economic Planning and Projection Systems (DEPPS)
IDA-20	FYDP Improvement, Phase II
IDA-21	Force Modernization Metrics
IDA-22	O&M Program Balance
IDA-23	Active/Reserve Integration
IDA-24	Workload Forecasting for the Veterans Benefits Administration
IDA-25	Evaluation of TRICARE Program Costs
IDA-26	Reducing Defense Infrastructure Costs
IDA-27	Management Headquarters Analysis
IDA-28	Military Hospital Cost Analysis Management
IDA-29	DSCA Business Metrics

2. Summaries

The summaries of ongoing and planned cost research studies that follow are grouped by office or organization (separated by tabs) in the order indicated by the list of study titles in the previous section. The first part of each subsection describes the office or organization (name, location, director,² size, etc.).³ These are followed by the summaries themselves.

² Though their actual titles vary, we refer to the heads of the offices/organizations as “directors.”

³ If this description is blank, the office/organization did not provide one.

Near the end of each summary is a list of keywords the office or organization assigned to the study. (In some cases, keywords were modified for consistency.) These keywords were used in tabulating the numbers in Table III-3. The rows represent keywords and the columns represent offices and organizations. The number at the intersection of a row and column is the number of studies by the office or organization that have that keyword assigned to them.

Table III-3. Keyword Assignments

	PA&E	BMDO	CEAC	AMCRM	TACOM	SMDC	NCCA	ONR	NAVAIR	NAVSEA	NSWCDD	AFCAA	ASCFMC	AFSMC	SPS/CF	AERO	MITRE	RAND	CNA	IDA	Total
PERSPECTIVE																					
Industry	4	—	—	—	—	—	—	5	—	2	—	2	—	—	—	—	2	1	2	4	22
Government	12	10	16	1	—	—	14	8	—	4	3	22	2	2	1	7	1	2	1	26	132
CONTEXT																					
Estimating	7	2	6	—	1	6	9	5	5	6	3	18	2	2	1	5	1	2	—	11	92
Analysis	4	8	6	1	—	—	7	1	9	2	1	20	2	—	—	2	1	2	—	15	81
Reviewing/Monitoring	5	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	7
Policy	—	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	7	9
Programming	6	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	1	—	7	16
Budgeting	—	—	2	—	—	—	—	1	—	3	1	—	—	—	—	—	—	—	1	4	12
OBJECT																					
Forces	7	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1	1	—	5	15
Weapon Systems	3	3	7	1	—	1	1	—	3	4	1	3	2	—	—	—	1	—	—	—	30
Aircraft	—	—	—	—	—	—	2	1	6	2	—	3	1	—	—	—	—	—	1	3	19
Helicopters	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Missiles	—	5	1	—	—	6	1	—	—	—	—	3	—	—	—	—	—	—	—	2	18
Ships	—	—	—	—	—	—	2	6	—	6	3	—	—	—	—	—	—	—	—	—	17
Land Vehicles	—	—	1	—	1	—	—	—	1	—	—	—	—	—	—	7	—	—	—	—	3
Space Systems	—	—	1	—	—	—	—	—	—	—	—	2	—	2	—	—	—	—	—	1	13
Airframe	—	—	—	—	—	—	—	1	—	—	—	1	1	—	—	—	—	1	—	—	4
Propulsion	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	1
Electronics/Avionics	—	4	—	—	—	5	7	—	—	2	—	1	1	1	—	—	—	1	—	—	22
Spares/Logistics	—	—	—	—	—	—	—	—	—	1	—	4	—	—	—	—	—	—	1	—	5
Facilities	4	—	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	1	8
Infrastructure	—	—	—	—	—	—	2	—	—	1	—	1	—	—	—	—	2	—	2	6	14
Manpower/Personnel	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	3	5
STAGE																					
Concept Development	—	—	—	—	—	—	—	5	—	1	—	—	1	—	—	1	—	—	—	—	8
Demonstration/Validation	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2	—	1	—	5
EMD	2	2	—	—	—	—	4	—	—	3	—	2	—	2	—	5	—	1	—	7	28
Production	2	2	—	—	—	—	3	3	—	4	1	3	1	2	—	6	—	1	—	7	35
Test and Evaluation	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	3
Operations and Support	—	1	2	—	1	—	8	4	—	4	—	2	—	—	1	—	—	1	1	6	31
Retirement and Demilitarization	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Life Cycle	3	2	—	1	—	1	2	4	—	1	2	16	—	—	—	—	—	—	—	5	37

(Continued on the next page.)

Table III-3—Continued

FOCUS	PA&E	BMDO	CEAC	AMCRM	TACOM	SMDC	NCCA	ONR	NAVAIR	NAVSEA	NSWCDD	AFCAA	ASC/FMC	AFSMC	SPS/CF	AERO	MITRE	RAND	CNA	IDA	Total
Labor	2	—	—	—	—	—	—	—	—	2	1	5	—	—	—	—	—	—	—	3	13
Material	3	1	—	—	—	—	—	—	—	2	1	5	—	—	—	—	—	1	—	2	15
Overhead/Indirect	4	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	4	10
Engineering	1	4	—	—	—	—	—	—	—	3	1	—	—	—	—	—	—	—	—	1	11
Manufacturing	—	5	—	—	—	—	—	—	—	—	1	—	—	—	—	1	—	1	—	1	9
CPR/CCDR	—	—	2	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	4
WBS	—	—	1	—	—	—	1	—	—	2	1	—	—	2	—	6	—	—	—	—	13
Fixed Costs	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	1	4
Variable Costs	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	2	4
Production Rate	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	4
Acquisition Strategy	2	—	—	—	—	—	—	—	—	3	1	—	—	—	—	3	—	—	1	4	15
Automation	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1	1	—	4
Advanced Technology	1	—	—	—	—	4	2	1	—	—	—	—	—	—	—	5	—	1	1	—	15
Risk/Uncertainty	—	1	—	—	—	—	—	5	—	3	1	—	—	—	—	1	—	—	—	1	12
Training	—	—	—	—	—	—	—	—	—	2	—	1	—	—	—	—	—	—	—	2	1
Readiness	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—	5
Reliability	—	—	—	—	—	—	—	3	—	1	—	—	—	—	—	—	—	—	—	—	4
Sustainability	—	—	—	—	—	—	4	—	3	3	—	—	—	—	—	—	—	—	—	—	9
Integration	—	—	—	1	—	—	—	—	1	1	—	—	—	1	—	—	—	—	—	—	1
Modification	—	—	—	—	—	—	—	—	4	—	—	—	—	—	—	—	—	—	—	—	4
Security	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Environment	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Schedule	1	—	—	—	—	—	2	—	—	—	—	—	—	—	—	1	—	—	—	6	10
Size	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Software	—	—	—	—	—	—	4	1	—	—	—	—	—	—	1	1	—	—	1	3	11

(Continued on the next page.)

Table III-3—Continued

APPROACH	PA&E	BMDO	CEAC	AMCRM	TACOM	SMDC	NCCA	ONR	NAVAIR	NAVSEA	NSWCDD	AFCAA	ASC/FMC	AFSMC	SPS/CF	AERO	MITRE	RAND	CNA	IDA	Total
Data Collection	1	4	4	—	—	1	6	5	8	2	—	18	—	1	—	5	2	2	—	12	71
Survey	—	—	—	—	—	—	—	—	—	2	1	—	—	1	—	—	2	1	—	—	7
Case Study	1	—	—	—	—	—	1	—	—	1	1	—	—	—	—	—	2	—	1	—	7
Mathematical Modeling	2	1	—	—	—	—	4	—	—	—	—	15	—	1	—	6	1	—	—	8	38
Economic Analysis	—	1	5	1	—	—	—	—	—	2	—	—	1	—	—	—	1	—	4	5	20
Cost/Production Function	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	1	1	4
Time Series	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	2
Statistics/Regression	—	4	—	1	—	1	6	—	—	1	1	13	—	2	—	5	—	1	1	4	40
PRODUCT																					
Data Base	1	1	11	—	—	1	11	—	1	4	—	19	1	2	—	5	—	1	2	12	72
Review	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	5
Method	—	—	—	—	—	5	7	—	3	1	1	2	—	2	—	—	2	2	—	5	30
Mathematical Model	—	2	—	—	—	—	—	1	3	3	3	—	1	1	—	1	—	—	—	9	21
Computer Model	2	1	—	—	—	—	—	—	2	2	1	16	1	—	1	5	1	1	—	6	39
Expert System	—	—	—	1	—	—	—	5	—	1	—	—	—	—	—	—	—	1	—	—	8
Cost Progress Curve	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	2
CER	—	4	3	—	—	5	6	1	3	3	—	12	—	2	—	4	—	1	—	2	46
Study	3	3	—	—	—	1	5	—	—	1	1	—	—	—	—	2	—	2	2	13	33

Program Analysis and Evaluation (PA&E)

Name:	Office of the Deputy Director (Resource Analysis), Program Analysis and Evaluation		
Address:	OSD(PA&E) 1800 Defense Pentagon Washington, DC 20301-1800		
Director:	Dr. David L. McNicol, (703) 695-0721		
Size:	Professional:	36	
	Support:	5	
	Consultants:	1	
	Subcontractors:	17	
Focus:	Cost Analysis Improvement Group (CAIG); Life-Cycle Costs of Major Defense Acquisition Programs; Force Structure; Operating and Support Costs; Economic Analysis		
Activity:	CAIG reviews and studies per year:		30-40
	POM, budget, FYDP reviews:		As required

PA&E-1

Title: Force and Support Cost (FSC) System

Summary: Funding provides software maintenance of portions previously developed. FSC must be imported from Ingres to ORACLE and from Excel 4.0 macro language to Excel Visual Basic. This effort also provides critical client software support through Microsoft Office applications such as the electronic FYDP book.

Classification: Unclassified

Sponsor: OSD(PA&E)
FICAD
The Pentagon, Room BE798
Washington, DC 20301
Lance Roark, (703) 697-4312

Performer: UNISYS

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	96	\$170,000	
	97	\$200,000	
	98	\$275,000	
	99	\$365,000	
	00	\$375,000	

Schedule: Start End
Ongoing

Data Base: Title:
 Description:
 Automation:

Publications: TBD

Keywords: Government, Programming, Forces, Life Cycle, Acquisition Strategy, Mathematical Modeling, Computer Model

PA&E-2

Title: Visibility and Management of Operating and Support Costs (VAMOSC) for Major Weapon Systems

Summary: Supports the VAMOSC Improvement and Enhancement Working (VIEW) Group as a forum for the exchange of ideas to improve the existing VAMOSC systems. Task includes assessment of Service VAMOSC databases and associated data sources, implementation of an OSD web site that provides ready access to CAIG O&S policies along with the Services' VAMOSC systems, and analysis of VAMOSC data for weapon systems.

Classification: Unclassified

Sponsor: OSD(PA&E)
FICAD
The Pentagon, Room BE798
Washington, DC 20301
Krysty Kolesar, (703) 697-0222

Performer: Andrulis

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	96	\$275,000	
	97	\$150,000	
	98	\$170,000	
	99	\$170,000	
	00	\$200,000	

Schedule: Start End
Ongoing

Data Base: Title:
Description:
Automation:

Publications:

Keywords: Government, Estimating, Reviewing/Monitoring, Programming, Forces, Facilities, Overhead/Indirect

PA&E-3

Title: O&M Program Balance and Related Cost Drivers

Summary: The objective of this effort is to support a comprehensive, global assessment of programmed operations and maintenance (O&M) funding. PA&E has a major initiative to collect O&M data that links program and budget, and provides visibility into major categories of O&M, including costs driven by equipment OPTEMPO, civilian personnel, transportation and facilities support.

Classification: Unclassified

Sponsor: OSD(PA&E)
FICAD

The Pentagon, Room BE798
Washington, DC 20301
Krysty Kolesar, (703) 697-0222

Performer: IDA

Resources: FY Dollars Staff-years
00 \$230,000

Schedule: Start End
Oct 99

Data Base: *Title:*
Description:
Automation:

Publications:

Keywords: Government, Estimating, Reviewing/Monitoring, Programming, Forces, Facilities,
Overhead/Indirect

PA&E-4

Title: Facilities Assessment Database (FAD)

Summary: This project facilitates the analysis of the Department's installation infrastructure. The FAD will provide access to data necessary to assess and validate component planning, programming, and budgeting input as well as facilitate force and infrastructure analyses. FAD will link installation, personnel, and weapon systems data. A prototype FAD model has been delivered that provides detailed real property inventory data and a "no-frills" analytic tool. The goals of the current phase are to finalize the model and expand it to include personnel data, weapon system inventory data, and RPM/BOS costs. This will require research of existing DoD databases to link historic to present infrastructure data such as DFAS' RPM/BOS execution data. Personnel and weapon system inventory data from each Service's authoritative databases will be linked to FAD.

Classification: Unclassified

Sponsor: OSD(PA&E)
The Pentagon, Rm. BE798
Washington, DC 20301
LTC Keith Kasperson, (703) 695-7710

Performer: UNISYS

Resources: FY Dollars Staff-years
99 \$250,000
00 \$250,000

Schedule: Start End
Ongoing

Data Base: *Title:*
Description:
Automation:

Publications:

Keywords: Government, Estimating, Reviewing/Monitoring, Programming, Forces, Facilities,
Overhead/Indirect

PA&E-5

Title: Reducing Defense Infrastructure Costs

Summary: The Quadrennial Defense Review (QDR) necessitates the ability to evaluate force structure alternatives and the capability to understand the cost implications of infrastructure needed to support those alternatives. The study will analyze FYDP and other cost data from the Department and the commercial sector, as well as draw upon previous analysis such as that done for the Bottom-Up Review. It will use statistical methods to derive relationships between infrastructure spending by area and Service, and hypothesized determinants, including force structure.

Classification: Unclassified

Sponsor: OSD(PA&E)
FICAD
The Pentagon, Rm. BE798
Washington, DC 20301
LTC Keith Kasperson, (703) 695-7710

Performer: IDA

Resources: FY Dollars Staff-years
00 \$300,000

Schedule: Start End
Oct 99

Data Base: *Title:*
Description:
Automation:

Publications:

Keywords: Government, Estimating, Reviewing/Monitoring, Programming, Forces, Facilities, Overhead/Indirect

PA&E-6

Title: Selected Acquisition Report (SAR) Cost Variance Analysis

Summary: The project will provide insight into the magnitude and sources of major defense acquisition program (MDAP) cost growth. The project will quantify the amount of MDAP cost growth that is attributable to policy decisions as well as the amount attributable to errors on the part of the acquisition community as a whole. The principal investigators will transfer historical cost data, cost variance data, and explanatory notes contained in SARs to an electronic spreadsheet. In addition to recording the SAR taxonomy of cost variances, the principal investigators will classify historical cost variances according to a new taxonomy, which will be provided by the project sponsor.

Classification: Unclassified

Sponsor: OSD(PA&E)
PFED
The Pentagon, Room 2C-282
Washington, DC 20301
Mark Daley, (703) 693-7828

Performer: NAVSHIPSO

Resources: FY Dollars Staff-years
 00 \$215,000

Schedule: Start End
 Ongoing

Data Base: Title:
Description:
Automation:

Publications:

Keywords: Industry, Government, Estimating, Weapon Systems, Review, Study

PA&E-7

Title: Cost Estimating in New Manufacturing Environments

Summary: The project will examine development and manufacturing costs of X-band, transmit/receive-based phased-array radars to examine cost reduction initiatives arising from improvements in the design and manufacturing processes. The goal is to develop methodologies for evaluating the effects of these initiatives on the costs of major weapon systems.

Classification: Unclassified

Sponsor: OSD(PA&E)
 OAPPD
 The Pentagon, Room BE829
 Washington, DC 20301
 Richard P. Burke, (703) 697-5056

Performer: IDA

Resources: FY Dollars Staff-years
 00 \$100,000

Schedule: Start End
 Jan 00

Data Base: Title:
Description:
Automation:

Publications:

Keywords: Industry, Estimating, Production, Acquisition Strategy, Automation, Advanced Technology, Case Study, Review

PA&E-8

Title: IDA Cost Research Symposium

Summary: IDA conducts a cost research symposium to facilitate the exchange of information on cost research that is in progress and planned, thereby avoiding wasteful duplication of effort and providing for more informed research planning decisions by participating offices. The Chairman, OSD CAIG, cosponsors this symposium. The 1999 Symposium will focus on the status of the Military Departments' capabilities to estimate the costs of weapon systems. Documentation of the symposium includes a catalog of cost research projects recently completed or still in progress at participating offices.

Classification: Unclassified

Sponsor: IDA Central Research Program
OD(PA&E)

Performer: IDA
Dr. Stephen J. Balut, (703) 845-2527

Resources: FY Dollars Staff-years
00 \$30,000 (PA&E share)

Schedule: Start End
Oct 99 Sep 00

Data Base: **Title:** DoD Cost Research Projects
Description: Summary descriptions of cost research projects (an example is this description)
Automation: On the web in Acrobat Reader.

Publications: *The 2000 IDA Cost Research Symposium*, Stephen J. Balut, Document D-XXXX, Unclassified, August 2000.

Keywords: Government, Reviewing/Monitoring, Forces, Weapon Systems, Life Cycle, Data Collection, Data Base

PA&E-9

Title: Understanding the Sources of Cost Growth

Summary: The project will assemble a database on cost growth as evidenced in Selected Acquisition Reports (SARs) and will permit rapid analysis of the extent and causes of cost growth in Major Defense Acquisition Programs.

Classification: Unclassified

Sponsor: OSD(PA&E)
P&FED
The Pentagon, Room 2C-282
Washington, DC 20301
Mark Daley (703) 693-7828

Performer: RAND

Resources: FY Dollars Staff-years
99 \$180,000
00 \$165,000

Schedule: Start End
Ongoing

Data Base: **Title:**
Description:
Automation:

Publications:

Keywords: Government, Analysis, Weapon Systems, EMD, Production

PA&E-10

Title: Cost of Developing and Producing Next Generation Tactical Aircraft

Summary: Over the next five years, DoD will be making funding decisions for tactical aircraft development and production, amounting to over \$350 billion. CAIG is responsible for preparing independent cost estimates for these aircraft for cost certification to Congress. The existing tools do not address the cost of the new generation fighter aircraft. Design attributes of the next generation of tactical aircraft are not accommodated in existing cost estimating tools. Important attributes include low observable, advanced materials (both composites and metals), integrated avionics, and unique propulsion designs. These attributes are all evident in the F-22 and Joint Strike Fighter (JSF) programs. An urgent need exists to develop the necessary cost estimating tools to support these and future tactical aircraft programs. The objective is to collect, analyze, and exploit the latest available information to develop databases and methods for estimating the development and production costs of the next generation tactical aircraft.

Classification: Unclassified

Sponsor: OSD(PA&E)
WSCAD
The Pentagon, Room BE779
Washington, DC 20301
Gary Pennett, (703) 697-7282

Performer: IDA
Mr. Bruce Harmon, (703) 845-2501

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
97	\$350,000	2
98	\$350,000	2
99	\$150,000	0.8
00	\$200,000	

Schedule:

<u>Start</u>	<u>End</u>
ongoing	

Data Base:

Title:

Description: Cost and other data on contemporary aircraft programs, including F-117, B-2, YF/F-22, YF-23, F/A-18E/F, V-22, C-17

Automation: TBD

Publications:

Keywords: Government, Estimating, Analysis, Aircraft, EMD, Material, Demonstration/Validation, Engineering

PA&E-11

Title: Contractor Cost Data Reporting (CCDR) Clearinghouse/Repository

Summary: The DoD develops cost estimates of major weapon systems using historical data, the primary sources of which are the Contractor Cost Data Reports (CCDRs) provided by hundreds of defense contractors. CCDR data requirements have not been revised substantially since the system was established nearly two decades ago. In annual meetings at IDA on cost research, the directors of the major DoD organizations that do defense cost research noted that the CCDR system had not been meeting their needs. Since then, steps have been taken to improve the usefulness of the CCDR system, to

include analysis and reengineering of the system. This effort addresses additional steps that will further improve the utility of the CCDR system. This includes preparation of the CCDR Handbook that is consistent with established CCDR policies, DoD cost estimating requirements, and contractor capabilities. The study will also evaluate the existing CCDR report formats and make appropriate recommendations to re-design or replace the forms. In this regard, IDA will review and evaluate the availability of DCAA provided data to satisfy overhead cost estimating needs. This task will also address the potential for developing and implementing a system to collect data directly from the contractor's accounting system and convert or map the data into the standard CCDR report formats.

Classification: Unclassified

Sponsor: OD(PA&E), WSCAD
The Pentagon, Rm. BE779
Washington, DC 20301
Thomas J. Coonce, (703) 602-3301

Performer: To Be Determined

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	97	\$150,000	
	98	\$220,000	
	99	\$ 75,000	
	00	\$230,000	

Schedule: Start End
ongoing

Data Base: Title:
Description:
Automation:

Publications:

Keywords: Government, Industry, Analysis, Labor, Material, Schedule, Study

PA&E-12

Title: Aircraft Production Support Labor Cost Study

Summary: This study will take a fresh look at how the DoD cost community estimates support labor costs. Many defense contractors and some government acquisition offices contend that current cost estimating methodologies cannot be used to predict accurately the cost of new programs employing new business/acquisition practices. Some new aircraft programs (B-2, C-17, F-22), when compared to other historical aircraft, have exhibited extremely high recurring engineering hours. The research will review historical aircraft data to determine which efforts are fixed versus variable with quantity, determine the impact of the use of more exotic materials (composites, thermoplastics, titanium, etc.), explore existing and new cost estimating methodologies, and determine the effect of new acquisition and business practices.

Classification: Unclassified

Sponsor: OSD(PA&E)
WSCAD
The Pentagon, Room 2C-282
Washington, DC 20301
Gary Bliss, (703) 695-4348

Performer: IDA

Resources: FY Dollars Staff-years
 00 \$200,000
Schedule: Start End
 Oct 99
Data Base: Title:
Description:
Automation:
Publications:
Keywords: Government, Industry, Analysis, Labor, Material, Study

PA&E-13

Title: Analysis of Customer-Provider Program Balance for Defense Working Capital Funds (DWCF)

Summary: The DoD spends approximately \$80 billion per year through its DWCF activities. There is currently no visibility in the FYDP of customer funding for these activities. The objective of this task is to develop statistical methods that will model the relationship between customer funding (as contained in the existing FYDP structure), and the resulting purchases from working capital funds over the program period. The model will allow OSD and the Services to assess the risks of potential migration due to customer underfunding, and it also would provide the working capital fund providers with a tool that could be used to improve their out-year revenue forecasts, resulting in improved workload planning.

Classification: Unclassified

Sponsor: OSD(PA&E)
 FICAD
 The Pentagon, Room BE798
 Washington, DC 20301
 Tom Dufresne, (703) 692-8052

Performer: LMI

Resources: FY Dollars Staff-years
 00 \$175,000

Schedule: Start End
 Oct 99

Data Base: Title:
Description:
Automation:

Publications:

Keywords: Government, Programming, Forces, Life Cycle, Mathematical Modeling, Computer Model

Ballistic Missile Defense Organization (BMDO)

Name:	Ballistic Missile Defense Organization BMDO/RME		
Address:	Crystal Square Two, Suite 809 1725 Jefferson Davis Highway Arlington, VA 22202		
Director:	Lowell Naef, (703) 604-0530 E-mail: lowell.naef@bmdo.osd.mil		
Size:	Professional:	7	
	Support (w/Subs):	36	
	Consultants:	—	
	Subcontractors:	12	
Focus:	BMDO Cost Policy, Cost Estimating, Cost Analysis, Cost Research/Methodology Improvement, POM and Budget Support		
Activity:	Number of projects in process:	4	
	Average duration of a project:	6.2m	
	Average number of staff members assigned to a project:	1.2	
	Average number of staff-years expended per project:	.4	
	Percentage of effort conducted by consultants:	0	
	Percentage of effort conducted by subcontractors:	40	

BMDO-1

Title: Development Phase CERs

Summary: Certain important CERs for the development phases require improvement. The set of CERs used by BMDO to estimate development engineering has a high standard error. Further it is desirable to use time as a predictor variable for both development engineering and development phase SEPM. This is a continuing effort (about 80% complete) that applies to both missile systems and electronics—the CERs differ between commodities. A report has been completed for development engineering, and reports for SEPM and tooling are nearly complete. Return costs for the PAC-3 EMD contract and the THAAD Missile and Radar PDRR contracts are used to validate the CERs.

Classification: Unclassified (Proprietary)

Sponsor: BMDO/RME
Lowell Naef (703) 604-0530

Performer: MCR Federal, Inc.
1111 Jefferson Davis Highway, Suite 601
Arlington VA 22202
Vernon Reisenleiter, Scott Vickers (703) 416-9500

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	98		1

Schedule:	<u>Start</u>	<u>End</u>
	Jul 98	Jun 00

Data Base: Title: Various sources

Description: (1) *Electronic Development to Production Cost Data Base Design and Implementation*, G. Kreisel and E. Carter, MCR, TR-8854/09-1, December 31, 1988 (2) *A Description of a Data Base Developed for Estimating EMD Costs of Avionics Programs*, D. Proctor and V. Reisenleiter, MCR, Working Note WN-9875/04-04, December 1, 1997 (3) *Estimating Avionics Program Support Costs for EMD Contracts*, J. Heilmeier and V. Reisenleiter, MCR, WN-9875/04-03, December 1, 1997; (4) Missile data is from a briefing package on the THAAD Robust Analogy Model (TRAM) and from *A Parametric Approach to Estimating the Cost of Development Engineering for the Research, Development, Test and Evaluation Phase*, J. Rowan, F. Maksimowski, B. Shelton, and L. Vaughn, SAIC, Sequence No. A079 CDRL No. A005, January 20, 1997 (5) CCDR Reports for THAAD PDRR and PAC-3 EMD

Automation: Microsoft Excel. Selected data as required to run analysis.

Publications: *Percent Factors For Estimating Electronic System Development Costs*, MCR, Technical Notice 00-01, J. Stephenson and V. Reisenleiter, October 27, 1999

Estimating Relationships for Development Engineering and Development Time, V. Reisenleiter, MCR, Technical Notice 00-02, February 17, 2000

Cost Estimating Relationships (CERs) for Development Phase Systems Engineering/Program Management (SE/PM), V. Reisenleiter, MCR, Technical Notice 00-05, Pending

Estimating EMD Tooling Costs for Missile Systems, P. Mezaros, D. Lachance, J. Gustave, S. Vickers, and V. Reisenleiter, MCR, Technical Notice 00-06, Pending

Keywords: Government; Analysis; Missiles, Electronics; EMD; Engineering; Statistics/Regression; CERs

BMDO-2

Title: BMDO Cost Risk Research

Summary: Cost Risk Research is a continuing effort—see below, under publications, for the results of recent efforts. The Ballistic Missile Defense Organization requires accurate cost risk estimation for budget preparation. A variety of risk research topics will be studied for continued enhancement of the BMDO cost risk model. Topics include: Revision of the assessment matrices used for the National Missile Defense infrastructure elements; Risk in O&S; Cost Risk for the NMD System of Systems; Re-visit of Schedule/Technical (S/T) Mapping Equations; Schedule risk; Hardware-to-Below-the-Line cost growth correlation. The re-look at the mapping equations will consider using the technology readiness level (TRL) descriptors, used by NASA and the Air Force Research Laboratory, as part of the risk assessment process.

Classification: Unclassified

Sponsor: BMDO/RME
Lowell Naef (703) 604-0530

Performer: MCR Federal, Inc.
Vernon Reisenleiter (703) 416-9500
TASC, Inc
4801 Stonecroft Blvd.
Chantilly, VA 20151-3822
Dick Coleman, (703) 834-5000, Jessica Ayers (703) 416-9500

Resources: FY Dollars Staff-years
98 1.3 FTE

Schedule: Start End
 Oct 97 Indefinite

Data Base: Title:
 Description: Databases will consist of historical SARs and CPRs
 Automation: Microsoft Excel and Crystal Ball

Publications: *Cost Risk in Operations and Support Estimates*, J. R. Summerville, R. L. Coleman; *Cost Risk in a System of Systems*, R. L. Coleman, J. R. Summerville (both papers to be presented at the SCEA conference, June 2000)
 Ballistic Missile Defense Organization (BMDO) Cost Risk Procedures Manual, TASC for MCR, TR-9808-01, July 1998. A revision that implements the findings of analysis of cost estimating error is nearly complete

Keywords: Government; Analysis, Estimating; Weapon Systems; Life Cycle; Risk/Uncertainty; Mathematical Modeling; Computer Model

BMDO-3

Title: Cost Driver Analysis/Technology Insertion

Summary: BMDO has established a technology roadmap and prioritized its technology development programs; however, the speed of technology advancement in many instances relegates identified technologies to obsolescent before fielding can be achieved. With the movement to insert updated technology through the use of the spiral development model, BMDO has taken steps to identify existing and emerging technologies. This research effort supports that objective. It is being done in conjunction with a working group whose membership, using identified cost drivers, is responsible for identifying existing/emerging technologies having the potential to mitigate identified cost driver, performing technical evaluations, developing life cycle cost estimates, and conducting economic analyses. These inputs will be used by the Director in making decisions on allocating available resources to BMDO's Major Defense Acquisition Programs (MDAPs). This project includes service participation.

Classification: Unclassified

Sponsor: BMDO/RME
 Lowell Naef (703) 604-0530

Performer: MCR Federal, Inc.
 Robert Roit, (703) 416-9500, Vernon Reisenleiter (703) 416-9500

Resources: FY Dollars Staff-years
 00 1 FTE

Schedule: Start End
 Mar 00 Indefinite

Data Base: Title:
 Description: Data base will consist of lists of cost drivers, critical parameters, and candidate cost improvement projects.
 Automation: Manual at this time

Publications: TBD

Keywords: Government; Estimating, Weapons Systems; Life Cycle; Economic Analysis

BMDO-4

Title: Time Phasing Algorithms for Prototype Manufacturing and Development Engineering

Summary: Prototype manufacturing and development engineering are two of the most influential development phase cost elements. Yet the methodology for spreading their cost over time is, very often, based solely on analysts judgement. The purpose of this research is to find appropriate, i.e. sufficient, models for observed cumulative expenditures. We have completed analysis of recurring hardware costs from the two THAAD PDRR contracts, and have coded Visual Basic Macros to implement the spreading function in Excel. We will document this analysis and prepare instructions for the user in the near future. There has also been some analysis of expenditures for hardware design.

Classification: Unclassified

Sponsor: BMDO/RME
Lowell Naef (703) 604-0530

Performer: MCR Federal, Inc.
Vernon Reisenleiter (703) 416-9500

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00		.5

Schedule:

<u>Start</u>	<u>End</u>
Sep 99	Aug 00

Data Base:

Title:	CCDRs and CPRs
	<i>Expenditure Profiles on a Missile Development Contract, V.</i> Reisenleiter, NCA Technical Report 005-95, September 25, 1995
Description:	Sequential CCDR submittals for THAAD Missile and Radar PDRR, Patriot first production and AMRAAM first production. Time series data on SM2-Block IV development.
Automation:	Microsoft Excel.

Publications: Technical Notices pending

Keywords: Government, Analysis, Missiles, Electronics, Development, Manufacturing, Mathematical Model

BMDO-5

Title:	Fixed Site Early Warning Radar
Summary:	This type of radar has some unique programmatic features. These include turn-key contracts, mixing development and production activities (and funding) on the same contract, production in a factory environment with final integration and assembly at a remote site. The purpose of this research is to collect cost, technical, and programmatic data on these radar including support concepts and O&S experience. The goal, of course, is to improve BMDO estimates for THAAD GBR, NMD XBR, and the UEWR upgrades. We have obtained cost data on and reported a partial comparison (level two costs) of COBRA Dane, PAVE PAWS, PAVE PAWS expansion, COBRA JUDY (S and X band), BMEWS Site 1 upgrade, and the GBR family (PDRR contract). We will collect technical data on these radars to facilitate a comparing a breakdown of PME costs.
Classification:	Unclassified (proprietary), Classified supplement possible
Sponsor:	BMDO/RME Lowell Naef (703) 604-0530
Performer:	MCR Federal, Inc. Vernon Reisenleiter (703) 416-9500

Resources: FY Dollars Staff-years
98 .5

Schedule: Start End
Mar 98 Oct 00

Data Base: Title: Various
Description: Information on the PAVE PAWS (sites 1/2 and 3/4) and the COBRA JUDY radars are from a spreadsheet prepared for U.S. Army SMDC by Technomics and Tecolote. We completed normalizing the below-the-line costs and broke out some software costs that were carried in PME.
BMEWS Site III Upgrade Final Cost Study, N. Albert, H. Apgar, K. Carlson, J. Fuller, and P. Meisl, MCR, TR-8859/05-2, April 28, 1989
THAAD Cost Research, J. McDowell, M. Allen, D. Arnold, B. Frederick, B. Allen, and D. Yates, Tecolote, CR-0896, September 1997
NMD GBR-P Cost Performance Report (CPR) for period ended 28 February 1999, 24 March 1999

Automation: Microsoft Excel

Publications: *Prime Mission Equipment (PME) and Other Costs for Early Warning (EW) Radars and the GBR Family of Radars*, MCR, Technical Notice 00-04, March 27, 2000

Keywords: Government, Estimating, Production, Manufacturing, Engineering, Data Collection, Data Base, Study

BMDO-6

Title: Learning Slope, Production Rate Effect and the Prototype to Production Step-Down Factor

Summary: An analysis of missile data conducted for NCCA in 1990 simultaneously determined production and development phase learning curve slopes and a prototype to production step-down factor. The analysis was updated for NAVAIR 1997. The purpose of this effort is to conduct similar analysis for electronic systems (completed) and to update the analysis for missiles with an expanded data set.

Classification: Unclassified (Proprietary)

Sponsor: BMDO/RME
Lowell Naef (703) 604-0530

Performer: MCR Federal, Inc.
Vernon Reisenleiter (703) 416-9500

Resources: FY Dollars Staff-years
00 .25

Schedule: Start End
Jul 98 Dec 00

Data Base: Title: Various studies
Description: *Electronic Development to Production Cost Data Base Design and Implementation*, G. Kreisel and E. Carter, MCR, TR-8854/09-1, December 31, 1988
Missile cost and quantities from *THAAD Cost Research*, J. McDowell, M. Allen, D. Arnold, B. Frederick, B. Allen, and D. Yates, Tecolote, CR-0896, September 1997

Automation: Microsoft Excel

Keywords: Government, Analysis, Missiles, Electronics, Production, Manufacturing, Data Collection, Statistics/Regression, CER

BMD0-9

Summary: With multiple programs in the early to mid-development stages, when O&S trades are of most benefit, the BMDO has found that O&S considerations are of growing importance to their systems decision analysis processes. The desire to maximize the return on budgeted acquisition dollars, reduced operating and maintenance budgets, and the need to trade off capabilities to reduce costs, means that better information on the cost to field a system is necessary. Concurrently, it was noted that there is no common system of systems approach to O&S costing across these programs. Definition of the O&S period, ground rules for application of O&S costs, system life span, and rules for apportionment of O&S across multiple systems are among the issues which have been addressed in revised O&S guidance (see publications). Futures efforts will explore using OSMIS, VAMOSC, and AFTOC to improve the BMDO cost models.

Classification: Unclassified

Sponsor: BMDO/RME
Lowell Naef (703) 604-0530

Performer: MCR Federal, Inc.
Joe Wagner, Scott Vickers, and Vernon Reisenleiter (703) 416-9500

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	00		3

<i>Schedule:</i>	<i><u>Start</u></i>	<i><u>End</u></i>
	Feb 98	Indefinite

Data Base: **Title:** **N/A**

Description:

Automation:

Publications: *BMDO Operating & Support Cost Estimating Guide 4251*, August 1999

Keywords: Government; Policy, Analysis; Operations and Support; Sustainability; Data Collection; CER

BMDO-10

Title: Ad-Hoc Analysis

Summary: In providing ongoing support to the program element analysts, unanticipated short-term research tasks arise. This project description reports two such efforts. The first report resulted from the initiative of a junior analyst. The second resulted from an effort to address a number of issues identified in a Red Team review of NMD element cost models.

Classification: Unclassified (Proprietary)

Sponsor: BMDO/RME
Lowell Naef (703) 604-0530

Army Cost and Economic Analysis Center (CEAC)

Name: U.S. Army Cost and Economic Analysis Center

Address: 1421 Jefferson Davis Highway, Suite 9000
Arlington, VA 22201-3259

Director: Robert W. Young; (703) 601-4200
DSN: 329-4200
FAX: (703) 601-4430

Size: Professional: 56
Support: 10
Consultants: 0
Subcontractors: 1

Focus: The focus of the Army's Centrally Funded Cost Research Program is to improve the capability of the Army to develop cost estimates and economic analyses. The main categories of concentration are:

- Data Base Development
- Methodology Development
- Costing the Effects of New Technology
- Software Support Systems
- PPBES Linkages

The Commodity areas we cover are:

- Aircraft Systems
- Missiles and Space Systems
- Wheel and Tracked Combat Vehicle Systems
- Communications and Electronics Systems
- General Systems/Future Technology/Tools and Models
- Information Management Systems
- Force Unit Costing
- Operating and Support Costing
- Financial Management and Operations

Activity:

Number of projects in process:	6-10
Average duration of a project:	9-12 months
Average number of staff members assigned to a project:	0.25
Average number of staff-years expended per project:	2
Percentage of effort conducted by consultants:	0%
Percentage of effort conducted by contractors:	90%
Percentage of effort conducted by subcontractors:	5%

CEAC-1

Title: Operating and Support Management Information System (OSMIS) Data Base Management

Summary: OSMIS is a Management Information System designed to assist the Army in determining the historical operating and support costs of selected major fielded weapons systems through the production of cost data and cost factors based on actual usage data. The cost data generated from OSMIS is derived from existing Army Logistics Support

Management Information Systems. Develop annual data collection process, collect data from LIF, PMR, ULLS and other sources. Construct annual Materiel Systems Definition by system/Line Item Number. Generate and validate Weapon system to ammunition crosswalk tables, Unit tables and system asset tables, Cost Tables and OSMIS Cost Tables. Perform system maintenance and develop system documentation.

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
Terry Mateer, (703) 601-4155/DSN 329-4155

Performer: CALIBRE Systems, Inc.
Bernard Bean

Resources: FY Dollars
99 \$2,313,999

Schedule: Start End
Nov 99 Nov 2000

Data Base: OSMIS

Publications: U.S Army Operating and Support Management Information System (OSMIS) online interactive relational database with 7 years of historical data.

Keywords: Government, Estimating, Analysis, Budgeting, Weapon Systems, Operations and Support, Data Base

CEAC-2

Title: Operating and Support Management Information System (OSMIS) Output Products

Summary: OSMIS is a Management Information System designed to assist the Army in determining the historical operating and support costs of selected major fielded weapons systems through the production of cost data and cost factors based on actual usage data. The cost data generated from OSMIS is derived from existing Army Logistics Support Management Information Systems. This contract develops O&S Cost Factors for the POM, BES and President's Budget, Aircraft reimbursement rates, Class II & IV Cost Factors and management reports on data collected. The OSMIS processed data is used in other systems and models such as FORCES, REVOLVER, and the OSD VAMOSC System Interface Model. OSMIS also contains information on consumables, depot level reparable (DLRs), training ammunition, OPTEMPO, densities, depot maintenance, and petroleum, oil and lubricants (POL). This effort updates and maintains a relational database. Other special studies include; Increase OSMIS database coverage for Contractor Logistics Support, Integrated Sustainment Maintenance, IMPAC purchases and warranty demands. Create OCIE market basket to support PPBES, Investigate sources for PDSS information. Coordinate Master System Definitions with system PMOs for validation and verification. Investigate ULLS-G for additional useful data, Incorporate Army Modernization Reference Data into OSMIS database. Develop procedure for tracking Training Resource Model projections with historical OSMIS data. Investigate LIF/CDBB as sources of data and recommend necessary fixes/changes to improve databases. Develop methodology to account for age of the fleet tactical, combat vehicles and aircraft

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
Terry Mateer, (703) 601-4155/DSN 329-4155

Performer: CALIBRE Systems, Inc.
Bernard Bean

Resources: FY Dollars

	99	\$963,539
Schedule:	<u>Start</u>	<u>End</u>
	Dec 1999	Dec 2000
Data Base:	OSMIS	
Publications:	"Cost Factors as required by the OPTEMPO Working Group to support the Presidents' Budget, POM and BES"; Aircraft Reimbursement Rates; Class II and IV Cost Factors	
Keywords:	Government, Estimating, Analysis, Budgeting, Weapon Systems, Operations and Support, Data Base	

CEAC-3

Title: ACEIT Help-Desk

Summary: This project funds the Army portion of a joint effort of the US Army Cost and Economic Analysis Center and the Air Force Electronic Systems Center and Air Force Cost Analysis Agency to meet the Army Cost Estimation Support Requirements. This funds dial up support for technical assistance when required for Army Cost Analysts and support contractors. It includes the update of annual Inflation Indices, problem resolution, bug fixes and configuration control for Army Acquisition Information/Databases

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
Richard Bishop, (703) 601-4163/DSN 329-4163

Performer: Tecolote Research, Inc.
Tom Kielpinski

Resources: FY Dollars
2000 \$75,000

Schedule: Start End
Apr 2000 Oct 2000

Data Base: IBM PC Compatible

Publications: Tecolote ACE-IT Users Guide

Keywords: Government, Weapon Systems, DataBase

CEAC-4

Title: ACEIT Enhancements

Summary: This project funds the Army portion of a joint effort of the US Army Cost and Economic Analysis Center and the Air Force Electronic Systems Center and Air Force Cost Analysis Agency to meet the Army Cost Estimation Support Requirements. This effort funds a long list of ACEIT enhancements requested or documented by Army cost analysts in Software Error and Enhancement Forms (SERFs). Some of the most significant new features are "CALC Trace Back", "Improved CALC Speed", "Variable Map", "Drag and Drop whole rows or selected cells", better report generation capability and similar requested features.

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
Richard Bishop, (703) 601-4163/DSN 329-4163

Performer: Tecolote Research, Inc.
Tom Kielpinski

Resources: FY Dollars
 1999 \$285,000

Schedule: Start End
 July 1999 July 2000

Data Base: IBM PC Compatible

Publications: Tecolote ACE-IT Users Guide

Keywords: Government, Weapon Systems, Data Base

CEAC-5

Title: ACDB Sustainment and Enhancements

Summary: This project funds the Army portion of a joint effort of the US Army Cost and Economic Analysis Center and the Air Force Electronic Systems Center and Air Force Cost Analysis Agency to meet the Army Cost Estimation Support Requirements. This effort funds the continued improvement of the ACDB database report generator (Report Wizard). This effort funds the analysis of errors, bugs and fixes as well as the completion of the Database Developers Kit (DDK). ACDB is the database engine i.e. search and retrieval system for creating and maintaining the required cost, technical and programmatic databases that support cost estimating. USACEAC currently has four databases available. These are Rotary Wing (Aircraft), Missile and Munitions, Wheel and Tracked Vehicles, and the Communications-Electronics database. The DDK module provides a developers interface that is nearly identical in look, feel and operation with the user search and retrieval interface. This contract acts as the Super Database Administrator (DBA) for USACEAC commodity contractors' DBAs and also training and help for DBAs.

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
 Richard Bishop, (703) 601-4163/DSN 329-4163

Performer: Tecolote Research, Inc.
 Tom Kielpinski

Resources: FY Dollars
 1999 \$200,000

Schedule: Start End
 July 1999 July 2000

Data Base: IBM PC Compatible

Publications: Tecolote ACE-IT Users Guide

Keywords: Government, Weapon Systems, Data Base

CEAC-6

Title: Communications and Electronics Cost Data Base/Methodology

Summary: This project will expand the Communications and Electronics Database. This effort will add additional Army communications-electronics systems to the database. The database module has developed a common Work Breakdown Structure (WBS) that describes a comprehensive set of communications systems from small radios to large network control stations. The database includes cost, technical and programmatic data for thirteen development programs for nine Army Communication systems. The database will support the investigation of future alternatives for wireless network connectivity; develop useful factors and investigate potential models supporting this new capability.

Classification: Unclassified
Sponsor: US Army Cost and Economic Analysis Center
Performer: Technomics, Inc.
 John Horak
Resources: FY Dollars
 2000 \$125,000
Schedule: Start End
 Apr 1999 Apr 2000
Data Base: ACDB
Publications: Communications and Electronics Cost Model, TR-9607-01, October 1996
Keywords: Government, Estimating, Analysis, WBS, Data Base, CER, Data Collection

CEAC-7

Title: Army Tri-Service Missile and Smart Munitions Database
Summary: USACEAC developed a standard architecture for the acquisition of Weapon systems. USACEAC in conjunction with the Air Force and Navy Cost Communities has participated in the joint development and maturation of this Tri-Service database. The primary objective of this project has been collect missile cost data from CCDRs, CPRs, contracts or other sources which can be mapped and normalized to populate the Missile database. The database currently contains 947 raw missile cost records. Of this total 664 have been analyzed and mapped into standard WBS form. This Project added approximately 300 Army missile records. The database contains technical and programmatic data and can be used to develop learning curves and cost factors.
Classification: Unclassified
Sponsor: US Army Cost and Economic Analysis Center
Performer: Tecolote Research, Inc.
Resources: FY Dollars
 1999 \$100,000
Schedule: Start End
 Apr 1999 Apr 2000
Data Base: Automated Cost Data Base (ACDB)
Publications:
Keywords: Government, Estimating, Analysis, Missiles, Space Systems, Data Base, CER, CPR/CCDR, Data Collection

CEAC-8

Title: Wheel and Tracked Vehicle Data Base and Methodology Development
Summary: This project will provide USACEAC continued support in the development of a Wheeled and Tracked Vehicle Module (WTVM) for the Automated Cost Database (ACDB). Support will consist of data collection and analysis, data base evaluation and management, and the development of cost relationships using collected data. The database is fielded at USACEAC, PEO-GROUND COMBAT & SUPPORT SYSTEMS, and TACOM. The current database contains 1527 tasks form 795 contracts. Approximately 1200 of these records are contract data. This and the current projects are expected to add approximately 1000 tasks to the database and improve the technical and

programmatic information. Performing special studies and analyses that further the state of the art of cost estimation of Wheeled and Tracked Vehicle Systems.

Classification: Unclassified
Sponsor: US Army Cost and Economic Analysis Center
Performer: Science Applications International Corporation (SAIC) Len Ogborn
Resources: FY Dollars
2000 \$100,000
Schedule: Start End
May 1999 May 2000
Data Base: Automated Cost Data Base (ACDB)
Publications:
Keywords: Government, Estimating, Analysis, Land Vehicles, CER, CPR/CCDR, Data Collection, Data Base

CEAC-9

Title: Aircraft Module Data Base and Cost Estimating Relationship (CER) Development
Summary: This project provides continued development and improvement of the Aircraft Rotary Wing Cost database. This project includes the transition of the Aircraft Module Database in Automated Cost Database (ACDB) to a new contractor to perform the Army Aircraft DBA tasks. The current database contains approximately 95% of the US Rotary Wing Cost Data, the technical data is 50% completed and the programmatic data is 30% complete. This project is expected to add additional cost, programmatic, and technical data for programs such as the Comanche, Longbow Apache Airframe Modifications, Longbow Apache Fire Control Radar, ATIRCM/CMWS, Blackhawk, Improved Cargo Helicopter, and the V-22 Osprey EMD contract.

Classification: Unclassified
Sponsor: US Army Cost and Economic Analysis Center
Performer: Ketron
Phil Wilson
Resources: FY Dollars
1999 \$200,000
Schedule: Start End
May 1999 September 2000
Data Base: Automated Cost Data Base (ACDB)
Publications:
Keywords: Government, Estimating, Analysis, Helicopters, Data Collection, Data Base

CEAC-10

Title: ACEIT Standard Applications Interface

Summary: This project will develop an ACEIT standard interface to Engineering and/or effectiveness models. A prototype for a tactical missile performance based cost model will be developed.

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
Richard Bishop, (703) 601-4163/DSN 329-4163

Performer: Tecolote Research, Inc.
John McGahan

Resources:

<u>FY</u>	<u>Dollars</u>
1999	\$100,000

Schedule:

<u>Start</u>	<u>End</u>
Sept 1999	Sept 2000

Data Base: IBM PC Compatible

Publications:

Keywords: Government, Weapon Systems, Data Base, Economic Analysis

CEAC-11

Title: ACEIT FSCS O&S Cost CAIV

Summary: This program funds the development of a CAIV capability to rapidly determine Operating and Support (O&S) cost early enough in the lifecycle costs to influence component trade-off, and component design. O&S costs typically comprise 60% of a program's life-cycle costs and there is recent emphasis on the need for this capability. The acquisition program chosen to develop this capability is the Future Scout and Cavalry System (FSCS). FSCS is a joint program with the United Kingdom. FSCS is the Army's only Fast Track Advanced Technology Demonstration program. It is currently in the Analysis of Alternatives phase.

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
John Bryant, (703) 601-4127/DSN 329-4127

Performer: Tecolote Research, Inc.
John McGahan

Resources:

<u>FY</u>	<u>Dollars</u>
1999	\$250,000

Schedule:

<u>Start</u>	<u>End</u>
Sept 1999	Sept 2000

Data Base: IBM PC Compatible

Publications:

Keywords: Government, Weapon Systems, Data Base, Economic Analysis

CEAC-12

Title: Cost Management & ABC Implementation

Summary: This project will develop Cost Management prototypes for eleven business areas as defined in the Army's Strategic Plan for Implementing Cost Management/ABC.

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
Steve Barth, (703) 601-4149/DSN 329-4149

Performer: Calibre Systems Inc.

Resources: FY Dollars
1999 \$450,000

Schedule: Start End
Sept 1999 Sept 2000

Data Base: IBM PC Compatible

Publications:

Keywords: Government, Economic Analysis

CEAC-13

Title: Installation Status Report (ISR) Part I, AIM-HI Cost Factors

Summary: This project will develop Facility Category Group (FCG) cost factors for new construction, renovation and sustainment using the applicable cost methodologies to support the Installation Status Report and the AIM-HI Model.

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
Roberto Troche, (703) 601-4151/DSN 329-4151

Performer: Management Analysis Inc.
T. Arthur Smith

Resources: FY Dollars
1999 \$85,000

Schedule: Start End
Oct 1999 Sept 2000

Data Base: IBM PC Compatible

Publications:

Keywords: Government, Facilities, Economic Analysis

CEAC-14

Title: Installation Status Report (ISR) Standard Service Cost (SSC) Part III

Summary: This project will develop cost factors/cost relationships for Installation services to support the Army BASOPS requirements generation model (AIM-HI) at the MACOM and Department of Army levels. Cost Factors will be based on historical cost, quantitative and qualitative data collected through ISR Part III and SBC Data collection efforts for FY 96, 97 and 98.

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
Steve Barth, (703) 601-4149/DSN 329-4149

Performer: Calibre Systems Inc.

Resources: FY Dollars
1999 \$245,000

Schedule: Start End
Sept 1999 Sept 2000

Data Base: IBM PC Compatible

Publications:

Keywords: Government, Economic Analysis

CEAC-15

Title: Civilian Costing System

Summary: The Civilian Costing System is a model used to develop civilian personnel costs in support of PPBES. This project funds the initial development of data models and the design of an interactive Web site that links to data sources. Intent is to provide a field analysis tool that facilitates early detection and correction of erroneous data, to provide information on the methodology and assumptions used to generate pay rates and to provide the cost factors for use by various customers in the Pentagon and the field.

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
Ralph Padgett, (703) 601-4148/DSN 329-4148

Performer: Calibre Systems Inc.
Name Jack Muterelli

Resources: FY Dollars
1999 \$230,000

Schedule: Start End
Sept 1999 Sept 2000

Data Base: IBM PC Compatible

Publications:

Keywords: Government

CEAC-16

Title: Force and Contingency Cost Models Update

Summary: This project will update Version 98.0 of FORCES and include the Contingency Operations Cost Model (ACM) and develop a WEB based interactive capability for the FORCES and the Cost Factor handbook. The FORCES Cost Model will be available for download from the FORCES website with frequent updates for O&S and equipment cost factors.

Classification: Unclassified

Sponsor: US Army Cost and Economic Analysis Center
Joe Gordon, (703) 601-4147/DSN 329-4147

Performer: Management Analysis Inc.

Resources: FY Dollars
 1999 \$576,000

Schedule: Start End
 July 1999 Sept 2000

Data Base: IBM PC Compatible

Publications:

Keywords: Government

Army Material Command (AMCRM)

Name:	U.S. Army Material Command, Cost Analysis Division		
Address:	5001 Eisenhower Avenue Alexandria, VA 22333-0001		
Director:	Mr. Kenneth F. Freund, (703) 617-9100		
Size:	Professional:	13	
	Support:	1	
	Consultants:	0	
	Subcontractors:	1	
Focus:			
Activity:	Number of projects in process:	1	
	Average duration of a project:	3 years	
	Average number of staff members assigned to a project:	1	
	Average number of staff-years expended per project:	0.10	
	Percentage of effort conducted by consultants:	0%	
	Percentage of effort conducted by subcontractors:	10%	

AMCRM-1

Title: ACE-IT Verification and Validation Tool

Summary: The ACEIT V&V Tool is an automated tool to assist cost analysis and validators in verifying the appropriateness of life cycle cost estimate methodology and time phased results at the WBS/Cost Element level. The V&V tool shall indicate acceptable ranges based on historical data obtained from the ACEIT libraries and PC ACDB for similar commodities/systems. The V&V tool will flag those costs which are outside acceptable ranges and which will require further evaluation. The ACEIT user shall be able to use the V&V tool while developing an estimate in ACEIT (real time) or choose to utilize it following completion of the estimate.

An Operational Prototype of the V&V tool was developed under an initial concept development phase. This effort resulted in a demonstrable capability that was integrated into the ACEIT 3.2 framework as part of the ACE Executive component. With this tool, an ACE user can quickly create a specialized V&V analysis template in Excel, which contains the time-phased costs from an ACE session down to the level of the Cost Element Structure (CES). These results can then be checked against a V&V rule database stored in Microsoft Access. Costs are then red or yellow flagged as a function of these rules.

This effort involves expansion of the initial proof-of-concept Operational Prototype to a full operational capability. The primary emphasis of this effort will be to increase the flexibility of the rule database to support a more robust set of rule formats and to provide a user friendly administration capability to easily allow an analyst to populate the rule database.

Classification: Unclassified

Sponsor: HQ AMC
Mr. Rex Stone
Phone: (703) 617-9102; DSN: 767-9102
FAX: (703) 617-8425
Email: rstone@hqamc.army.mil

Performer: Tecolote Research Inc.
John McGahan

Resources: FY Dollars Staff-years

Schedule: Start End
Sep 99 Aug 00

Data Base: IBM PC Compatible

Publications: Tecolote ACE-IT Users Guide

Categories: II.A.1, II.A.2

Keywords: Government, Analysis, Weapon Systems, Life Cycle, Statistics/Regression, Expert System

Tank-automotive and Armaments Command (TACOM)

Name:	Cost Analysis Division U.S. Army Tank-automotive and Armaments Command		
Address:	AMSTA-CM-BV Warren, MI 48397-5000		
Director:	Richard S. Bazy, (810) 574-6665 E-mail: bazyr@tacom.army.mil		
Size:	Professional:	40	
	Support:	1	
	Consultants:	0	
	Subcontractors:	0	
Focus:	Responsible for the preparation of Program Office Estimates, Life Cycle Cost Estimates, and Economic Analyses. Perform cost validation to determine the reasonableness of cost estimates. Support the Earned Value Management Process. Develop cost models and data bases along with performing cost research. Support is provided to combat and combat support vehicle systems.		
Activity:	Number of projects in process:	29	
	Average duration of a project:	3-20 weeks	
	Average number of staff members assigned to a project:	1-3	
	Average number of staff-years expended per project:		
	Percentage of effort conducted by consultants:	0%	
	Percentage of effort conducted by subcontractors:	0%	

TACOM-1

Title: Hercules Total Ownership Cost Reduction (TOCR) Model

Summary: The objective of this project to develop a process and model for the Hercules Product Manager to evaluate the cost effectiveness of Total Ownership Cost Reduction (TOCR) initiatives.

Classification: Unclassified

Sponsor: US Army Tank-automotive and Armaments Command
AMSTA-CM-BV
Richard Bazy, (810) 574-6665

Performer: US Army Tank-automotive and Armaments Command
AMSTA-CM-BV
Diane Hohn; Ron DiCesare (810) 574-4114

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	00	\$180,000	2.0

Schedule:	<u>Start</u>	<u>End</u>
	Aug 99	Apr 00

Data Base: None

Publications: None

Keywords: Estimating, Land Vehicles, Operations and Support, Sustainability, Economic Analysis.

Army Aviation and Missile Command (AMCOM)

Description and summaries not submitted.

Army Space and Missile Defense Command (SMDC)

Name:	U.S. Army Space and Missile Defense Command		
Address:	SMDC-SP-C 106 Wynn Drive, P.O. Box 1500 Huntsville, AL 35807		
Director:	Colonel Ouellette, Deputy Chief of Staff for Strategic Planning and Analysis Mr. Jackson G. Calvert, Cost Performance and Analysis Division Chief, (205) 955-3612		
Size:	Professional:	9	
	Support:	2.5	
	Consultants:	Mevatech Corporation	
	Subcontractors:	SAIC, Technomics	
Focus:	Systems Costs, Component Cost Analyses, Economic Analyses		
Activity:	Number of projects in process:	2	
	Average duration of a project:	1 year	
	Average number of staff members assigned to a project:	1	
	Average number of staff-years expended per project:	0.25	
	Percentage of effort conducted by consultants:	25%	
	Percentage of effort conducted by subcontractors:	50%	

SMDC-1

Title: Updated Ground Based Radar Independent Cost Model

Summary: The Ground Based Radar Independent Cost Model (GBR ICM) was completed in October 1993 and most of the data used for developing the cost model is Traveling Waveform Tube and outdated solid state radar. The radar being proposed and developed for Ballistic Missile Defense efforts are solid state Transmit/Receive module radar. The task involves the development of cost estimating relationships to estimate the cost of ground based radar for National Missile Defense and Theater Missile Defense systems. Data from solid state radar will be used to update the GBR ICM, and this data will be collected by members of the US Army Space and Missile Defense Command Cost Analysis Division and the contractor.

Classification: Classified

Sponsor: Jack Calvert, (256) 955-3612 (jack.calvert@smdc.army.mil)

Performer: SAIC
Jack Calvert (US Army SMDC), Bill Shelton (SAIC), and Rick Taylor (SAIC)

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
		\$154,000	0.2

Schedule:	<u>Start</u>	<u>End</u>
	Jun 98	Sep 99

Data Base: **Title:**

Description: DoD systems

Automation: Strategic and Theater Automated Research (STAR)

Publications: N/A

Category: II.A.2
Keywords: Estimating, Missiles, Weapon Systems, Electronics/Avionics, Life Cycle, Data Collection, Statistics/Regression, Data Base, CER

SMDC-2

Title: Strategic Missile Model Update
Summary: Since the origination of the Strategic Missile Model, a number of new cost estimating methodologies have been developed. The goal of the subject task is to obtain an updated model that will apply to a number of missile systems (e.g., THAAD, MEADS, PAC-3).
Classification: Unclassified
Sponsor: Jack Calvert, (205) 955-3612, (jack.calvert@smdc.army.mil)
Performer: Tecolote Research, Inc.
Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$125,000	0.1

Schedule:

<u>Start</u>	<u>End</u>
Apr 00	Dec 00

Data Base: **Title:**
Description: DOD systems
Automation: Strategic and Theater Automated Research (STAR)
Publications: To be completed
Category: II.A.2
Keywords: Estimating, Missiles, Electronics/Avionics, Advanced Technology, Method

SMDC-3

Title: Strategic and Experimental IR Sensor Cost Model III
Summary: There have been a number of recent developments in modern missile seeker technologies. The goal of this effort is to collect cost, technical, and other data required to develop cost estimating relationships, and update the Strategic and Experimental IR Sensor Cost Model II. CERs to be developed include those for optical telescope assembly/structure, focal plane array, cryogenic cooler, analog electronics, digital electronics, and gimbal/servo electronics/IMUs.
Sponsor: Jack Calvert, (205) 955-3612 (jack.calvert@smdc.army.mil)
Performer: Technomics, Inc.
Jack Calvert and John Horak
Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	\$150,000	0.2

Schedule:

<u>Start</u>	<u>End</u>
Apr 99	Jun 00

Data Base: **Title:**
Description: DOD systems
Automation: Strategic and Theater Automated Research (STAR)
Publications: To Be Determined
Category: II.A.2
Keywords: Estimating, Missiles, Electronics/Avionics, Advanced Technology, Method, CER

SMDC-4

Title: Update Rocket Motor/Propulsion Cost Estimating Relationship

Summary: The Rocket Motor/Propulsion CER was completed in 1980 and all of the data used for developing the CER is for metallic case motors. Many of the missiles and rocket motors currently being proposed and developed for Ballistic Missile Defense use composite cases, and are driven by weight restrictions. The task involves the development of cost estimating relationships to estimate the cost of the rocket motor/propulsion system for Ballistic Missile Defense. Data from various surface-to-air and surface-to-surface Army and Navy missiles will be used to update the CER, and this data will be collected by members of the US Army Space and Missile Defense Command, Deputy Chief of Staff for Strategic Planning and Analysis, Cost Performance and Analysis Division.

Sponsor: Jackson G. Calvert (256) 955-3612 (jack.calvert@smdc.army.mil)

Performer: Robbie Holcombe (256) 955-5466
Warren Fitzgerald
Jayson Wilson

Resources: FY Dollars Staff-years
\$0 0.75

Schedule: Start End
Feb 00 Dec 00

Data Base: Title:
Description: DOD Systems
Automation: Strategic and Theater Automated Research (STAR)

Publications: To Be Determined

Category: II.A.2

Keywords: Estimating, Missiles, Electronics/Avionics, Advanced Technology, Method, CER

SMDC-5

Title: Inertial Measurement Unit (IMU) Cost Resource Data Book

Summary: This effort was initially focused toward developing a set of cost estimating relationships for IMUs. In fact, CERs were developed for IMUs that employ ring laser gyros, but the author does not have great confidence in these models, due to the small data set and the number of variables involved. The data book developed during this effort, however, has potential to provide significant assistance to the cost analyst. Technical and cost data was collected for a number of significant weapon systems and IMU technologies.

Sponsor: Jack Calvert, (256) 955-3612 (jack.calvert@smdc.army.mil)

Performer: US Army Space and Missile Defense Command
Edward C. Strange (256) 955-4522 and Robbie Holcombe (256) 955-5466

Resources: FY Dollars Staff-years
\$0 0.25

Schedule: Start End
Jun 99 Nov 99

Data Base: Title:
Description: DoD Systems
Automation: Strategic and Theater Automated Research (STAR)

Publications: To be determined

Category: II.A.2
Keywords: Estimating, Missiles, Electronics/Avionics, Advanced Technology, Method, CER

SMDC-6

Title: Interceptor Control Surface Cost Estimating Relationship

Summary: A review of the US Army Space and Missile Defense Cost Database did not reveal any Cost Estimating Relationships (CERs) that addressed specific types of aerodynamic surfaces. The purpose of this research is to analysis and develop a cost estimating relationship for interceptor control surfaces (wings and fins) that will be applicable for costing future interceptor control surfaces.

Sponsor: Ed Strange, (256) 955-4921 (ed.strange@smdc.army.mil)
Jack Calvert (256) 955-3612

Performer: Ed Strange (US Army SMDC), Warren Fitzgerald (US Army SMDC), Robbie Holcombe (US Army SMDC)

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
\$0		0.5

Schedule:

<u>Start</u>	<u>End</u>
May 99	Aug 99

Data Base: **Title:**
Description: DoD systems
Automation: Strategic and Theater Automated Research (STAR)

Publication: To be determined

Category: II.A.2

Keywords: Estimating, Missiles, Method, CER

Naval Center for Cost Analysis (NCCA)

Name: Naval Center for Cost Analysis (NCCA)
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Washington, DC 20393-5444
Director: Captain Christopher Owens, (202) 764-2430
Size: Professional:
Support:
Consultants:
Subcontractors:
Focus:
Activity: Number of projects in process:
Average duration of a project:
Average number of staff members assigned to a project:
Average number of staff-years expended per project:
Percentage of effort conducted by consultants:
Percentage of effort conducted by subcontractors:

NCCA-1

Title Ship and Shipboard System Operating and Support Cost Analysis Model (OSCAM-Ship, OSCAM-Sys)

Summary: These two models were developed using a "system dynamics" approach. This approach provides a structured methodology for dealing with complex systems having many interacting components. A system dynamics approach enables us to capture the dynamic behavior of a system while allowing for a flexible design which can be easily enhanced and expanded. The model provides the flexibility for fast, top-level cost estimating, as well as the framework for analyzing possible policy decisions and their impact on cost and availability. Model outputs include both cost and availability. The inclusion of availability within the model is crucial because cost reduction policies need to be analyzed in conjunction with their impact on availability, and vice versa.

Classification: Unclassified

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Mr. Rick Collins, (202) 764-2610
Specialist Procurement Services/Cost Forecasting (SPS/CF)
MoD Abbey Wood
P.O. Box 702
Bristol BS12 7DU
UK
Mr. Adrian Radford 011 44 117 91 32733

Performer: NCCA in-house, UK MoD in-house and HVR Consulting Services, Ltd
Mr. Brian Oceau, NCCA, (202) 764-2432
Mr. Brian Tanner, UK MoD, 011 44 117 91 32768
Mr. Jonathan Coyle, HVR CSL, 011 44 1420 87977

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	96	UK\$ only	1.0
	97	UK\$ only	1.5
	98	\$123,000 + UK\$	0.75
	99	\$125,000 + UK\$	0.5
	00	\$96,203 + UK\$	0.5

Schedule:	<u>Start</u>	<u>End</u>	
	Jan 97	Nov 97	Version 1 development
	Dec 97	Feb 98	Version 2 development
	Aug 98	Apr 99	Version 3 development
	May 99	Apr 00	Version 4 development
	Jun 00	Mar 01	Continuing Enhancements

Data Base: VAMOSC/other cost data and technical data

Publications: Mathematical model and supporting documentation accessible via www.ncca.navy.mil

Keywords: Government, Estimating, Analysis, Operations and Support, Sustainability, Ships, Mathematical Modeling, Statistics/Regression, Data Base, Method, CER, Study

NCCA-2

Title: Aircraft Operating and Support Cost Analysis Model (OSCAM-Air)

Summary: This model is being developed using a "system dynamics" approach. This approach provides a structured methodology for dealing with complex systems having many interacting components. A system dynamics approach enables us to capture the dynamic behavior of a system while allowing for a flexible design which can be easily enhanced and expanded. Many questions posed today (e.g., How can the Navy reduce operating and support costs while maintaining readiness?) cannot be addressed with existing tools. The model will provide the flexibility for fast, top-level cost estimating, as well as the framework for analyzing possible policy decisions and their impact on cost and availability. Model outputs will include both cost and availability. The inclusion of availability within the model is crucial because cost reduction policies need to be analyzed in conjunction with their impact on availability, and vice versa.

Classification: Unclassified

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 P.O. Box 702
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 UK
 Mr. Adrian Radford 011 44 117 91 32733

Performer: NCCA in-house, UK MoD in-house and HVR Consulting Services, Ltd
 Mr. Brian Oceau, NCCA, (202) 764-2432
 Mr. Adrian Radford 011 44 117 91 32733
 Mr. Jonathan Coyle, HVR CSL, 011 44 1420 87977

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	99	\$100,000 + UK\$	0.75
	00	\$105,018	0.75

Schedule: Start End
 Apr 99 Sep 99 (Prototype development)
 Oct 99 Apr 00 (Version 1 development)
 Jun 00 Mar01 (Continuing enhancements)

Data Base: VAMOSC/other cost data and technical data

Publications: Mathematical model and supporting documentation accessible via www.ncca.navy.mil

Keywords: Government, Estimating, Analysis, Operations and Support, Sustainability, Aircraft, Mathematical Modeling, Statistics/Regression, Data Base, Method, CER, Study

NCCA-3

Title: Avionics Operating and Support Cost Analysis Model (OSCAM-Air Sys)

Summary: This model will be developed using a "system dynamics" approach. This approach provides a structured methodology for dealing with complex systems having many interacting components. A system dynamics approach enables us to capture the dynamic behavior of a system while allowing for a flexible design which can be easily enhanced and expanded. Many questions posed today (e.g., How can the Navy reduce operating and support costs while maintaining readiness?) cannot be addressed with existing tools. The model will provide the flexibility for fast, top-level cost estimating, as well as the framework for analyzing possible policy decisions and their impact on cost and availability. Model outputs will include both cost and availability. The inclusion of availability within the model is crucial because cost reduction policies need to be analyzed in conjunction with their impact on availability, and vice versa.

Classification: Unclassified

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 UK
 Mr. Adrian Radford 011 44 117 91 32733

Performer: NCCA in-house, UK MoD in-house and HVR Consulting Services, Ltd
 Mr. Brian Oceau, NCCA, (202) 764-2432
 Mr. Adrian Radford 011 44 117 91 32733
 Mr. Jonathan Coyle, HVR CSL, 142 087977

Resources: FY Dollars Staff-years
 00 TBD 0.5

Schedule: Start End
 Jul 00 Nov 00 (Prototype development)

Data Base: VAMOSC/other cost data and technical data

Publications: Mathematical model and supporting documentation accessible via www.ncca.navy.mil

Keywords: Government, Estimating, Analysis, Operations and Support, Sustainability, Electronics/Avionics, Mathematical Modeling, Statistics/Regression, Data Base, Method, CER, Study

NCCA-4

Title: Advanced Amphibious Assault Vehicle (AAAV) Operating and Support Cost Analysis Model (OSCAM-AAAV)

Summary: This model will be developed using a "system dynamics" approach. This approach provides a structured methodology for dealing with complex systems having many interacting components. A system dynamics approach enables us to capture the dynamic behavior of a system while allowing for a flexible design which can be easily enhanced and expanded. Many questions posed today (e.g., How can the Navy reduce operating and support costs while maintaining readiness?) cannot be addressed with existing tools. The model will provide the flexibility for fast, top-level cost estimating, as well as the framework for analyzing possible policy decisions and their impact on cost and availability. Model outputs will include both cost and availability. The inclusion of availability within the model is crucial because cost reduction policies need to be analyzed in conjunction with their impact on availability, and vice versa.

Classification: Unclassified

Sponsor: Naval Center for Cost Analysis (NCCA)
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Mr. Rick Collins, (202) 764-2610

Performer: AAAV Program Office, NCCA in-house, UK MoD in-house and HVR Consulting Services, Ltd
Mr. Jack Rothwell, AAAV DRPM, 703-492-3346
Mr. Brian Oceau, NCCA, (202) 764-2432
Mr. Jonathan Coyle, HVR CSL, 142 087977

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$112,000	0.85

Schedule:

<u>Start</u>	<u>End</u>
Apr 00	Sep 00 (Version 1 development)

Data Base: VAMOS/other cost data and technical data

Publications: Mathematical model and supporting documentation accessible via www.ncca.navy.mil

Keywords: Government, Estimating, Analysis, Operations and Support, Sustainability, Electronics/Avionics, Mathematical Modeling, Statistics/Regression, Data Base, Method, CER, Study

NCCA-5

Title: Cost of Manpower Estimating Tool (COMET v2.0)

Summary: COMET is a Windows95 based, PC, software (freeware) tool which provides users with the most accurate total Operating and Support (O&S) estimates for the costs (MPN and O&MN) of Navy manpower (active duty, reserve and civilian components) available. The "active duty" component identifies historic Cost Estimating Relationships (CERs) between the "direct" (MPN) costs our "deployable" forces (ships, squadrons and other "sea duty" personnel) and the "variable indirect" costs (MPN and O&MN) associated with "shore duty" personnel that recruit, train and support those "deployable" forces and themselves. The model presents the user with a high degree of cost granularity (encompassing 32 officer designators and 118 ratings and enlisted management communities) and additionally provides the user with easy-to-use screens (an "active duty tutorial" is free to download at the COMET web site) to perform life-cycle cost and delta analysis comparisons. COMET is in use now by Program Managers and Contractors

alike, in formulating intra-Navy Total Ownership Cost (TOC) plans and evaluating tradeoffs where different types of manpower options are compared or the affordability of embracing new technologies that will either generate or eliminate the requirement for manpower. Version 2.0 also incorporates a resident Ship's Manpower Document (SMD)Library that includes all current ship classes (.DAT files downloadable from the COMET web site).

Classification: Unclassified

Sponsor: Naval Center for Cost Analysis
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Mr. Rick Collins (202) 764-2610

Performer: NCCA in-house and SAG Corporation
CDR Mark Dye, NCCA, (202) 764-2617
Dr. Pat Mackin, SAG, (703) 538-4500

Classification: Unclassified

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	97	\$119,000	0.1
	98	\$77,000	0.25
	99	\$75,000	0.25
	00	\$75,000	0.50
	01	TBD	0.25

Schedule:	<u>Start</u>	<u>End</u>
	FY97	FY97 (initial update/revision)
	FY98	FY00 (annual updates)
	FY00	FY01 (add sea duty .DAT files)

Data Base: Revised Navy Billet Cost Factors/Model

Publications: Tool and supporting documentation accessible via www.ncca.navy.mil

Keywords: Infrastructure, Study, Government, Manpower/Personnel

NCCA-6

Title: Naval VAMOSC Database

Summary: The Visibility and Management of Operating and Support Cost (VAMOSC) database displays Naval operating and support (O&S) costs and related information (e.g., operating hours or manning levels) about ships, aircraft, ordnance and tracked/wheeled vehicles. Depending on the specific commodity type and system, this Oracle relational database contains up to 15 years of data presented by fiscal year by alternative hierarchical cost element structures. Depending on the cost element, data for a particular commodity is available not only at the system level, but also at the subsystem and component levels. A five year (FY00-03) improvement effort is underway to increase the breadth (i.e., weapon system and cost element coverage), depth (i.e., cost element visibility), timeliness and accessibility of the VAMOSC database.

Classification: Unclassified

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Mr. Rick Collins, (202) 764-2610

Performer: NCCA in-house, PricewaterhouseCoopers, Information Spectrum Inc. and others TBD

Mr. Rick Collins, (202) 764-2610
Mr. Al Leung, PWC, (703) 633-4305
Ms. Denise Lucero, ISI, (703) 813-8530

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
99	\$4,900,000	5
00	\$3,500,000	5

Schedule:

<u>Start</u>	<u>End</u>
FY 99	continuing

Data Base: VAMOSOC Ship, Air, Missile, Torpedo and Tracked/Wheeled Vehicle Data

Publications: Database and supporting documentation accessible via www.ncca.navy.mil

Keywords: Government, Operations and Support, Data Collection, Database

NCCA-7

Title: Integrated Detailed Total Operating and Support Cost Database

Summary: This project is developing a detailed, fully integrated, total operating and support cost database accessible via the Internet that will complement the direct costs in VAMOSOC. Presently called Navy Obligations Data Extraction System (NODES), it includes all costs in the OMN and MPN appropriations and is consistent with Navy programming, budgeting and accounting systems. It will be enhanced to include more appropriations, more detail and better linkage between indirect costs and weapon systems.

Classification: Unclassified

Sponsor: Naval Center for Cost Analysis (NCCA)
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4290 Mt. Vernon Dr. NW Suite 18200
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Mr. Rick Collins, (202) 764-2610

Performer: NCCA in-house, Mathtech, Inc. and Information Spectrum, Inc. (ISI)
Mr. Robert Hiram, NCCA, (202) 764-2615
Mr. Steve Taylor, Mathtech, (703) 294-5809
Mr. Ralph Groemping, ISI, (703) 813-8522

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
96	\$300,000	0.1
97	\$85,000	0.1
98	\$85,000	0.3
99	\$200,000	0.3
00	\$200,000	0.3

Schedule:

<u>Start</u>	<u>End</u>
FY96	TBD

Data Base: VAMOSOC, NODES, STARS, WINPAT

Publications: Database and supporting documentation available via www.ncca.navy.mil

Keywords: Government, Operations and Support, Infrastructure, Database

NCCA-8

Title: COTS Electronics Acquisition Cost Impact Factors

Summary: Develop expert opinion- and engineering-based commercial off-the-shelf (COTS) adjustment factors for application to: 1) military specification (MILSPEC) actuals (in the

case of hardware cost) and 2) MILSPEC-based estimating factors (in the case of contractor and government in-house support cost).

Classification: Unclassified

Sponsor: Naval Center for Cost Analysis (NCCA)

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4290 Mount Vernon Drive, N.W., Suite 18200
Washington, DC 20393-5444
Mr. Jack Smuck, (202) 764-2661 and Mr. Bill Stranges, (202) 764-2622

Performer: NCCA in-house and Naval Surface Warfare Center (NSWC)/Crane Division

Resources: FY Dollars Staff-years
00 TBD TBD

Schedule: Start End
TBD TBD

Data Base: TBD

Publications: TBD

Keywords: Government, Estimating, Electronics/Avionics, EMD, Production, WBS, Case Study, Method

NCCA-9

Title: Platform Integration Cost Database/Model for Electronics

Summary: A database and cost estimating methodology will be developed for projecting hardware integration and hardware/software integration costs for shipboard and airborne electronics. The database should include cost data, technical characteristics, and other relevant information (e.g., software size) for a variety of systems, including sonar, radar, fire control, EW, and launching systems. The cost data should include relevant contractor and Navy in-house costs.

Classification: Cost Data: Business Sensitive
Technical Characteristics: Classified

Sponsor: Naval Center for Cost Analysis (NCCA)

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Performer: NCCA in-house and Contractor

Resources: FY Dollars Staff-years
00 TBD TBD

Schedule: Start End
TBD TBD

Data Base: TBD

Publications: TBD

Keywords: Government, Estimating, Weapon Systems, Missiles, Ships, Aircraft, Electronics/Avionics, EMD, Production, Data Collection, Data Base, Method

NCCA-10

Title: MILSPEC Electronics Acquisition Cost/Technical Database

Summary: A Navy electronics module of the Automated Cost Database (ACDB) will be developed. The database will include development/production cost, technical and programmatic data for a variety of shipboard and airborne electronics systems, including sonar, radar, fire control, and electronic warfare systems.

Classification: Unclassified

Sponsor: Naval Center for Cost Analysis
Nebraska Avenue Complex
4290 Mount Vernon Drive NW, Suite 18200
Washington, DC 20393-5444
Dr. Brian Flynn, (202) 764-2630

Performer: NCCA in-house and Tecolote Research, Inc.
Mr. Lowell Blagmon, NCCA, (703) 604-0274
Mr. Robert Currie, Tecolote, (703) 243-2800

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
97	\$75,000	0.1
98	\$0	0.1
99	\$0	0
00	TBD	TBD

Schedule:

<u>Start</u>	<u>End</u>
Jul 97	TBD

Data Base: Navy ACDB Electronics Module Version 1, which includes raw (vice normalized) cost data (but no technical data) for AN/ALQ-165, AN/ALR-67, AN/APG-73, AN/BSY-1, AN/BSY-2, MK 7, AN/SQQ-89, AN/SQR-19 and AN/SQS-53C

Publications: TBD

Keywords: Government, Estimating, Analysis, Electronics/Avionics, EMD, Production, CPR/CCDR, Data Collection, Data Base

NCCA-11

Title: Weapon System Software Development Cost/Technical Database

Summary: This effort expanded the NCCA software effort, schedule, labor rate, and SLOC growth databases developed for the NCCA *Software Development Estimating Handbook—Phase One* analysis. Data from all commodities was collected from various DoD defense contractors. The near-term effort will entail performing various data analyses to develop a normalized database, which will be utilized to update the *Software Development Estimating Phase One Handbook*.

Classification: Unclassified

Sponsor: Naval Center for Cost Analysis
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Performer: NCCA in-house
Ms. Pamela L. Johnson, NCCA, (202) 764-2685

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
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	00	N/A	0.1
Schedule:	<u>Start</u>	<u>End</u>	
	Apr 99	TBD	
Data Base:	Separate NCCA software databases covering effort, schedule, labor rate and SLOC growth		
Publications:	TBD		
Keywords:	Government, Analysis, Electronics/Avionics, Life Cycle, Software, Data Collection, Data Base, Schedule, Risk/Uncertainty		

NCCA-12

Title: Weapon System Software Development Estimating Methodology

Summary: This effort will entail maintaining/updating the NCCA software effort, schedule, labor rate, and SLOC growth estimating methodologies developed for the *NCCA Software Development Estimating Phase One Handbook*. Effort will include updating the current software development estimating tools and documenting the results. Additionally, effort will target the identification and assessment of commercially available software development estimating methodologies.

Classification: Unclassified

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Performer: NCCA in-house
Ms. Pamela L. Johnson, (202) 764-2685
LCDR Susan Geshan (202) 764-2433

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	00	TBD	0.25

Schedule: Start End
TBD TBD

Data Base: TBD

Publications: Update of the *NCCA Software Development Estimating Handbook – Phase I*

Keywords: Government, Analysis, Electronics/Avionics, Life Cycle, Software, Data Collection, Data Base, Schedule, Risk/Uncertainty

NCCA-13

Title: Weapon System Software Maintenance Cost/Technical Database and Estimating Methodology

Summary: Software maintenance metrics and cost data were collected on a variety of weapon systems. The initial effort focused on shipboard electronic systems. This data will be used to develop software maintenance arrival/closure distribution curves and cost estimating relationships/factors. Follow-on efforts will focus on avionics and other aircraft software. This effort is a continuation of the NSWCCD project entitled, "Software Maintenance Cost Process Model."

Classification: Unclassified

Sponsor: Naval Center for Cost Analysis

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Performer: NCCA in-house and Technomics, Inc.
 Ms. Pamela L. Johnson, (202) 764-2685
 Mr. Gene Waller, Technomics, (805) 964-9894

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
96	\$74,000	0.1
97	\$50,000	0.1
98	\$100,000	0.1
99	\$0	0.15
00	TBD	0.15

Schedule:

<u>Start</u>	<u>End</u>
Feb 96	TBD

Data Base: TBD

Publications: TBD

Keywords: Government, Estimating, Software, Data Collection, Statistics/Regression, Data Base, CER, Operations and Support

NCCA-14

Title: Automated Information System (AIS) Software Cost/Technical Database and Estimating Methodology

Summary: This effort will: a) collect AIS software development and maintenance cost data and associated metrics (e.g., number of function points); b) create automated AIS software development and maintenance databases; c) determine what metrics drive AIS software costs; and d) develop cost estimating methodology. This effort will concentrate on developing tools for cost estimating in today's environment of 4GL, COTS, CASE tools, GUI builders, and open systems.

Classification: Unclassified

Sponsor: Naval Center for Cost Analysis

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Performer: NCCA in-house and Litton/TASC
 Ms. Pamela Johnson, NCCA, (202) 764-2685
 Mr. Mike Gallo, Litton/TASC, (703) 633-8300 x4549

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
98	\$100,000	0.1
99	\$90,000	0.1
00	\$107,000	0.15

Schedule:

<u>Start</u>	<u>End</u>
FY98	Nov 00

Data Base: AIS Software Development and Maintenance Cost/Technical Databases

Publications: TBD

Keywords: Government, Estimating, Demonstration/Validation, EMD, Operations and Support, Software, Statistics/Regression, Method, CER

Office of Naval Research (ONR)

Name: Office of Naval Research (ONR)
Address:
Director:
Size: Professional:
Support:
Consultants:
Subcontractors:
Focus:
Activity: Number of projects in process:
Average duration of a project:
Average number of staff members assigned to a project:
Average number of staff-years expended per project:
Percentage of effort conducted by consultants:
Percentage of effort conducted by subcontractors:

ONR-1

Title: Uncertainty Calculus to Minimize Total Ownership Costs for Ships

Summary: This project directly addresses affordability of ship systems by close collaboration with Navy programs to cooperatively develop mathematical models using uncertainty calculus to minimize Total Ownership Costs (TOC) for Navy ships. This efforts includes development of a Maintenance Cost model, development of a Technology Insertion model, and the development of a Geometry Cost Evaluation model. The research methods include data finding and knowledge elicitation, model construction using uncertainty calculus, and model validation/verification. This provides results immediately available to Navy program managers in the DD-21, NSSN, and LPD-17 programs with transition to other programs possible.

Classification: Reports are Unclassified, Capability to Manage Data to SECRET Level

Sponsor: Office of Naval Research
800 North Quincy Street
Arlington, VA 22217-5600
Ms. Katherine Drew, (703) 696-5992

Performer: Louisiana Tech University
PO Box 10348
Ruston, LA 71272-0046
CDR Alley C. Butler, USNR, (318) 257-2359

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
99	\$246K*	
00	\$24K*	
01	\$24K*	
02	\$19K*	

*matching funds and in-kind contribution from State of Louisiana and Louisiana Tech University total \$ 362K

Schedule: Start End
 May 15, 1999 May 14, 2002

Data Base: Probability and Fuzzy Systems

Publications: Public Domain as appropriate

Keywords: Government, Estimating, Ships, Concept Development, Life Cycle, Risk/Uncertainty,
 Data Collection, Expert System

ONR-2

Title: Affordability Measurement and Prediction Methods to Support Affordable Design of Ship Systems

Summary: Maximum reduction of cost occurs early in ship design when there is significant uncertainty. In this environment, development of novel ship systems means historic and probabilistic data is absent, and uncertainty based systems are necessary. The hierarchical and extendable decision tool developed in this project uses uncertainty based heuristic methods. Maintenance, repair, and reconditioning (overhaul) represents major and difficult to predict components of Total Ownership Cost (TOC). By developing a fuzzy system and probabilistic methods to address maintenance cost, new capability can be developed, not possible with current historic and parametric cost models. This project included demonstration of decision making for maintenance, repair, and reconditioning of SSGTG's (Ship Service Gas Turbine Generators) on destroyers as an initial proof of concept. This research is conducted in collaboration with Ingalls Shipbuilding. This project also includes plans for software evaluation and development with provisions for interoperability with ASSET, PASS, VAMOSEC, and other models. This project develops a flexible and extendable tool providing automation and decision support for Navy S&T managers.

Classification: Reports are Unclassified, Capability to Manage Data to SECRET Level

Sponsor: Office of Naval Research
 800 North Quincy Street
 Arlington, VA 22217-5600
 Ms. Katherine Drew, (703) 696-5992

Performer: Cognition Corporation Louisiana Tech University
 209 Burlington Road PO Box 10348
 Bedford, MA 01730 Ruston, LA 71272-0046
 Mr. Kevin Sullivan Dr. Alley C. Butler, PE
 (781) 271-0813 (318) 257-2359

 Ingalls Shipbuilding
 PO Box 149
 Pascagoula, MS 39568-0149
 Mr. J. D. Philo, (228) 935-5225

Resources: FY Dollars Staff-years
 99 \$70K STTR Phase I
 00 \$30K STTR Phase 1, Option

Schedule: Start End
 June 1, 1999 November 30, 1999STTR Phase I
 Feb. 24, 2000 May 23, 2000 STTR Phase I, Option

Data Base: Probability and Fuzzy Systems with Inference

Publications: Sullivan, Kevin, Alley Butler, Suresh Kalanthur, Dale Anderson, Tommy Baldwin, Mohit Kashyap, Brian Glausser, Frank Sturges, Dave Philo, Melvin Corley, "Research in Affordability Measurement and Prediction Methods to Support Affordable Design of

Ship Systems, STTR Phase I Report under ONR Contract Number N00014-99-M-0241, 1 December 1999, 108 pages.

Additional publications in the public domain are pending.

Keywords: Industry, Government, Estimating, Ships, Concept Development, Production, Life Cycle, Operations and Support, Risk/Uncertainty, Reliability, Data Collection, Expert System

ONR-3

Title: Technology Insertion Cost Estimation Comparison for Aircraft Carrier Systems

Summary: With limited budgets for weapon procurement, operation, and support, affordability becomes a key issue. No longer are decisions based solely on the absolute performance of the system; system ownership cost is now a major factor. A large portion of total ownership cost (TOC) is determined by decisions made very early in the design cycle, when limited information is available. This project provides a method for determining a portion of the total ownership costs for an aircraft carrier program. The costs of technology insertion are determined at the early stages of design using an uncertainty calculus tool developed in a related DEPSCoR project. These cost estimates are compared to estimates obtained through conventional methods to 'calibrate' or compare and thereby assess or determine the effectiveness and generality of the new cost tools. Significant participation by Newport News Shipbuilding and limited participation by NAVSEA is included.

Classification: Reports are Unclassified, Capability to Manage Data to SECRET Level

Sponsor: Office of Naval Research
800 North Quincy Street
Arlington, VA 22217-5600
Ms. Katherine Drew, (703) 696-5992

Performer: Louisiana Tech UniversityNewport News Shipbuilding
PO Box 10348
4101 Washington Avenue
Ruston, LA 71272-0046
Newport News, VA 23607
Dr. J. Mark Barker Mr. Robert Schatzel
(318) 257-2839 (757) 688-2124
Naval Sea Systems Command (SEA 0176)
2531 Jefferson Davis Highway
Arlington, VA 22242
Mr. Irvin Chewning, (703) 415-4815

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	00	\$164K*,**	
	01	\$241K*,**	

*in-kind contribution from Louisiana Tech University total \$ 8K

**assigned \$30K for NAVSEA 017

Schedule: Start End

Data Base: Parametric and Fuzzy Systems

Publications: Public Domain as appropriate

Keywords: Industry, Government, Estimating, Ships, Concept Development, Operations and Support, Risk/Uncertainty, Data Collection, Expert System

ONR-4

Title: Research in Affordability Measurement and Prediction Methods to Support Affordable Design of Ship Systems

Summary: The need for new tools to evaluate maintenance costs is of pressing concern. In Phase I of the STTR, and initial Science and Technology Decision Tool (STDT) was designed and demonstrated containing two major components: Decision Support and Cost Estimation. Phase II pursues further development to provide a general decision tool that can manage multiple objectives and constraints defined by deterministic, probabilistic (stochastic, numerical) parameters, and possibilistic variables (linguistic, fuzzy representation). The Phase II effort permits refinement of the system's user interface, develops interoperability with existing Navy cost and ship feasibility systems, expands the Fuzzy Logic Inference engine developed in Phase I to include other methods for fuzzy decision making, implements the Phase I developed plan to apply Artificial Intelligence Techniques to improve data obtained from the Navy's Open Architecture Retrieval System (OARS) which can then facilitate the improvement of the Cost Estimation model, providing a more complete set of statistics, cost, and heuristic information. The Phase II effort also includes identification of technology barriers limiting system performance and/or limiting maintenance cost reduction. It is expected that the identification process can provide technology pointers, allowing prioritization of R&D efforts. Additionally, this project demonstrates methods for assessment of military utility and value.

Classification: Reports are Unclassified, Capability to Manage Data to SECRET Level

Sponsor: Office of Naval Research
800 North Quincy Street
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Performer: Cognition Corporation Louisiana Tech University
209 Burlington Road PO Box 10348
Bedford, MA 01730 Ruston, LA 71272-0046
Mr. Kevin Sullivan Dr. Alley C. Butler, PE
(781) 271-0813 (318) 257-2359

Ingalls Shipbuilding
PO Box 149
Pascagoula, MS 39568-0149
Mr. J. D. Philo
(228) 935-5225

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$100K	STTR Phase II
01	\$200K	STTR Phase II
02	\$100K	STTR Phase II
02	\$50K	STTR Phase II, Option
03	\$50K	STTR Phase II, Option

Schedule:

<u>Start</u>	<u>End</u>
June 1, 2000	May 31, 2002STTR Phase II
June 1, 2002	May 31, 2003STTR Phase II, Option

Data Basen: Probability and Fuzzy Systems with Inference

Publications: Publications in the public domain are pending.

Keywords: Industry, Government, Estimating, Ships, Concept Development, Production, Life Cycle, Operations and Support, Risk/Uncertainty, Reliability, Data Collection, Expert System

ONR-5

Title: Marine Composites Affordability—A Knowledgebased Approach

Summary: With shrinking budgets, total ownership costs for ships must be reduced. Low cost methods are required for the design, manufacture, and maintenance of Naval ship components. One such application is the manufacturing of composite deckhouses. This project, focused on composite deckhouses, offers a means to rapidly assess the affordability of a ship's structure when it is designed using marine composites. This project uses a knowledgebase and an inference engine to query CAD files and provide Total Ownership Cost (TOC) on a component by component basis. Although this project represents an application to marine composites, use of this knowledgebased methodology can then be applied to other ship components in an analogous manner. This project includes participation by Louisiana Tech University, Avondale Industries, the University of New Orleans, and NSWC Carderock.

Classification: Reports are Unclassified, Capability to Manage Data to SECRET Level

Sponsor: Office of Naval Research
800 North Quincy Street
Arlington, VA 22217-5600
Ms. Katherine Drew, (703) 696-5992

Performer: Louisiana Tech University
PO Box 10348
Ruston, LA 71272-0046
Dr. H. Dwayne Jerro
(318) 257-2259
Avondale Industries
PO Box 50280
New Orleans, LA 70150
Mr. John White
(504) 437-3328

NSWC Carderock
9500 MacArthur Blvd.
West Bethesda, MD 20817
Dr. Milton Critchfield
(301) 227-1769
Univ. of New Orleans
913 Engineering Building
New Orleans, LA 70148
Mr. Will Lannes, PE
(504) 280-7122

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$201K *	
01	\$251K *	
02	\$316K *	
03	\$49 K	

- in-kind contribution from Louisiana Tech University total \$ 15K, and an in-kind contribution from Avondale Industries of \$ 56K, Carderock \$147.5

Schedule: Start End
May 1, 2000 April 30, 2003

Data Base: Knowledgebased System using Categorical and Probabilistic Methods

Publications: Public Domain as appropriate

Keywords: Industry, Government, Estimating, Ships, Concept Development, Production, Life Cycle, Operations and Support, Risk/Uncertainty, Reliability, Data Collection, Expert System

ONR-6

Title: Composites Affordability Initiative Cost Analysis Tool (CAICAT)

Summary: Cost Model developed jointly by AFRL, NAVAIR, Northrop Grumman, Boeing Seattle and St. Louis, Lockheed Martin, and General Electric. The program has a goal of developing a credible, rapid cost evaluation system for an Airframe Structure to address state-of-practice, state-of-the-art, and emerging design and manufacturing technologies. The Bottoms Up, Process-Based Model is incorporated in CAICAT software, which

addresses all elements of direct and indirect costs. The software is intended to be used primarily as a trade study tool.

Classification: Unclassified

Sponsors: Air Force Research Laboratory
Materials and Manufacturing Directorate
Wright Patterson Air Force Base
Dayton, Ohio 45433

Office of Naval Research
800 North Quincy Street
Arlington, VA 22217

Performers: AFRL, NAVAIR, Northrop Grumman, Boeing Seattle and St. Louis, Lockheed Martin, General Electric, and Galorath, Inc.

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	99	\$2.8 M (50-50 Cost Share by Government-Industry)	

Schedule:	<u>Start</u>	<u>End</u>
	May 97	Dec 00

Publication: Quarterly Reports, SAMPE publication

Keywords: CER, Software, Airframe

ONR-7

Title: Effect of New Technologies on Ship Systems: A System Dynamics Cost Modeling Approach

Summary: The introduction of new technologies often causes a temporary loss of productivity and leads to additional unforeseen costs over a system's life cycle. One of the reasons for this productivity degradation is that traditional systems engineering management fails to plan for the effects of technology procurement, implementation, and maintenance. The success of introducing new technologies for ship systems requires a high level of initial planning and cooperation among the customers (in this case the fleet), the suppliers (in this case the shipbuilder), and the government procurement organization. The capability of the technology, the skills of the users of the technology, and the ship system structure and performance must be collectively evaluated and reconfigured to determine the best operational environment for the new technology. Establishing this operational environment will determine the affordability of future ship systems. This research defines the problem of introducing new technologies for ship systems and outlines how ship system performance can be predicted, evaluated, and controlled using a system dynamics (SD) modeling approach with an embedded optimization routine called Data Envelopment Analysis.

Sponsor: Office of Naval Research
800 North Quincy Street
Arlington, VA 22217
Ms. Katherine Drew, (703) 696-5992

Performer: Virginia Tech
Department of Industrial and Systems Engineering
System Performance Laboratory
Dr. Kostas Triantis, Principal Investigator

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	2000-2001	\$105,206	
	2001-2002	\$170,827	
	2001-2003	\$163,858	

Schedule: Start End
 May 2000 May 2003

Data Base: VAMOSC and other cost and technical data.

Publications: Technical reports, scholarly refereed publications, model documentation.

Keywords: Industry, Analysis, Ships, Advanced Technology, Mathematical Modeling

Naval Air Systems Command (NAVAIR)

Name:	Naval Air Systems Command Headquarters	
Address:	Cost Department (AIR-4.2) 22347 Cedar Point Road, Unit 6 Patuxent River, MD 20670-1161	
Director:	Ronald J. Rosenthal, (301) 342-2191	
Size:	Professional:	
	NAVAIR HQ	52
	NAWC-AD-LAKE	10
	NAWC-AD-PAX	103
	NAWC-WD-CL	14
Focus:	<p>The Cost Department provides a wide variety of cost analysis products and services. The department's primary focus is to provide a clear and comprehensive understanding of life cycle cost and attendant uncertainties to be used in developing, acquiring, and supporting affordable Naval Aviation Systems. Besides life cycle cost estimates, the Cost Department provides source selection cost evaluation support, earned value management analysis, cost research, databases and various cost/benefit studies.</p> <p>The focus of NAVAIR cost research is: Total Ownership Cost initiatives; cost growth; modifications; cost/benefits; engineering investigations, and building comprehensive databases.</p>	
Activity:	Number of projects in process:	9
	Average duration of a project:	1 year
	Average number of staff members assigned to a project:	1-2
	Average number of staff-years expended per project:	1-2
	Percentage of effort conducted by consultants:	50%
	Percentage of effort conducted by subcontractors:	0%

NAVAIR-1

Title: Affordable Readiness Cost Model

Summary: Produced an Affordable Readiness Cost Model and accompanying Manual. The model is a comprehensive tool designed to assist in the preparation of Affordable Readiness Initiative proposals. The model has five different modules that allow the users to address a wide range of initiatives:

- Reliability
- Maintainability
- Obsolescence
- Depot
- General

The model aids the user in organizing the cost elements (e.g., Organizational -Level Maintenance) and cost estimating factors (e.g., Organizational-Level Labor Hours per Removal) in order to prepare effective and credible Affordable Readiness and similar types of initiatives. In addition to creating the Initiative Profile, the model also provides detailed analytical spreadsheets of the cost and schedule aspects of the proposed initiative.

Classification: Unclassified

Sponsor: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Performer: Ketron

Resources: FY Dollars Staff-years
99 \$285,000

Schedule: Start End
May 99 Jan 00

Data Base: Title:
Description:
Automation:

Publication: Technical Report

Keywords: Estimating, Analysis, Method, Data Collection, CER, Computer Model

NAVAIR-2

Title: SLAP/SLEP Full Scale Testing Model

Summary: Use the results of existing technical information and inputs from class desk personnel supporting programs currently evaluating SLAP/SLEP efforts to build an estimating model approach to estimating SLAP/SLEP and associated testing efforts. Research cost history for past SLAP/SLEP programs to identify key costs and cost drivers and use existing AV-3M/VAMOSC data to assess airframe maintenance and service bulletin cost trends. Using results of technical inputs and cost data, develop a simple model to aid in quick turn around assessments of the costs and potential O&S benefits of these types of programs. Model delivered on schedule.

Classification: Unclassified

Sponsor: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Performer: Tecolote

Resources: FY Dollars Staff-years
99 \$50,000

Schedule: Start End
May 99 Jan 00

Data Base: Title:
Description:
Automation:

Publication: Technical Report

Keywords: Estimating, Analysis, Method, Data Collection

NAVAIR-3

Title: Demilitarization/Disposal Model

Summary: A report was prepared on the costs associated with removing Naval Aviation aircraft and related equipment from active service and the production of a model based on historical data to estimate future demilitarization/demobilization costs for a given Type/Model

Aircraft. Since in many cases aircraft are removed from inventory and placed in long-term storage at AMARC, associated data and estimating relationships will also be incorporated into this model. Current model for the ongoing Environmental Consequences of Hazardous Operations (ECHO) project may be used in the development of this model.

Classification: Unclassified

Sponsor: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Performer: Naval Air Warfare Center—Aircraft Division
Lakehurst, New Jersey

Resources: FY Dollars Staff-years
99 \$35,000
00 \$7,000

Schedule: Start End
May 99 Mar 00

Data Base: Title:
Description:
Automation:

Publication: Technical Report

Keywords: Estimating, Analysis, Aircraft, Method, Data Collection

NAVAIR-4

Title: Aging Aircraft Study Cost Update

Summary: AIR-4.2.5 developed and updated a 1995 study on aging aircraft cost impacts for 13 major T/M/S aircraft. Given that the data used for this study did not contain the last 3-4 years of usage/cost data (and the interest in aging as a process) the study was updated. This effort included researching and updating the data for the impacted elements: labor at "O" and "I" levels; consumable materials; Depot Airframe and Engine rework; Fuel usage and Aviation Depot Level Repairable; and developing updated trend projections for future forecasting.

Classification: Unclassified

Sponsor: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Performer: Ketron

Resources: FY Dollars Staff-years
99 \$69,540

Schedule: Start End
May 99 Mar 00

Data Base: Title:
Description:
Automation:

Publication: Technical Report

Keywords: Data Collection, Aircraft, Analysis

NAVAIR-5

Title: Cost Growth Analysis

Summary: This task will investigate the cost growth experienced on historical Navy aircraft, weapons, and avionics programs. Data will be analyzed for specific NAVAIR programs, for NAVAIR commodity groups, and collectively for all NAVAIR programs including ACAT I, II, and III programs. The data will be organized in a cost growth database. The analysis will result in a conceptual approach for NAVAIR cost risk estimation.

Classification: Unclassified

Sponsor: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Performer: Litton/TASC

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
99	\$99,910	.75

Schedule:

<u>Start</u>	<u>End</u>
Mar 00	Sep 00

Data Base:

Title: NAVAIR Cost Growth Database

Description: NAVAIR aircraft, weapons, and avionics programs cost growth

Automation: TBD

Publication: Technical Report

Keywords: Aircraft, Weapons Systems

NAVAIR-6

Title: Naval Aircraft Modification Model (NAMM) Update

Summary: The task is to expand the coverage, functionality and usefulness of the existing NAMM database. Additional OSIP and modifications program data will be collected, normalized, and incorporated into the existing database of technical characteristics and program descriptions.

Classification: Unclassified

Sponsor: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Performer: MCR Federal

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$74,101	.75

Schedule:

<u>Start</u>	<u>End</u>
Dec 99	Jul 00

Data Base:

Title: Naval Aircraft Modifications Model (NAMM)

Description: Technical, programmatic and cost data for modifications programs.

Automation: Microsoft ACCESS

Publication: Technical Report

Keywords: Data Collection, Analysis, Aircraft

NAVAIR-7

Title: Force Level Economic Effectiveness Trade (FLEET) Model

Summary: A model will be developed that provides quick and reasonably accurate life cycle cost estimates for all active Navy aircraft programs. A model development plan will be established and followed by prototype and final model development. The FLEET model will provide cost insights on deferring development of follow-on aircraft, evaluating aircraft production rate alternatives, identifying potential Type/Model/Series aircraft for removal from the inventory, and determining when requirements for increased O&S costs and platform critical modifications reach levels that will require either a replacement, major upgrade or retirement decision.

Classification: Unclassified

Sponsor: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Performer: Tecolote

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$130,000	1.1

Schedule:

<u>Start</u>	<u>End</u>
Apr 00	Feb 01

Data Base: Title: N/A

Description:

Automation:

Publication: Technical Report, Model

Keywords: Estimating, Analysis, Aircraft

NAVAIR-8

Title: Engineering Investigations Cost Model (EICM)

Summary: The Engineering Investigation Cost Model (EICM) provides Fleet Support Teams (FST) with a tool to evaluate the cost and potential cost avoidance of performing a routine engineering investigation. The EICM allows users to assess the economic merits of conducting an EI on an aircraft subsystem, support equipment item, or weapon. Based on a minimum number of required data inputs, the model allows FST members to estimate the initial cost of conducting the EI, to determine the potential cost avoidance associated with fixing the problem item, and to calculate the maximum remedial action investment available while still generating a return on investment (ROI) of 5 to 1.

Classification: Unclassified

Sponsor: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Performer: Ketron

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	99	\$75,000	
	00	\$50,000	

Schedule: Start End
 Apr 99 Jul 00

Data Base: Title N/A

Description:

Automation:

Publication: Technical Report, Model

Keywords: Analysis, Aircraft

NAVAIR-9

Title: Avionics Database

Summary: A database of historical avionics cost, technical, and programmatic data is being developed. The database is being constructed to respond to ad hoc queries and to provide standard format reports.

Classification Unclassified

Sponsor: Naval Air Systems Command
 22347 Cedar Point Road, Unit 6
 Patuxent River, MD 20670-1161

Performer: Naval Air Systems Command
 22347 Cedar Point Road, Unit 6
 Patuxent River, MD 20670-1161

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	00	\$100,000	.75
	01	\$100,000	.75

Schedule: Start End
 Dec 99 Jul 01

Data Base: Title: Avionics Database

Description: Cost, technical, and programmatic data for historical avionics programs including IR, EO-IR, Comm/Nav, Radar, Inst/Proc

Automation: TBD

Publication: Technical Report—Database Documentation

Keywords: Data Collection

NAVAIR-10

Title: Rotary Wing Database

Summary: A database of historical helicopter cost, technical, and programmatic data is being developed. The database is being constructed to respond to ad hoc queries and to provide standard format reports.

Classification Unclassified

Sponsor: Naval Air Systems Command
 22347 Cedar Point Road, Unit 6
 Patuxent River, MD 20670-1161

Performer: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Resources: FY Dollars Staff-years
00 \$100,000 .75

Schedule: Start End
Dec 99 Jul 00

Data Base: Title Rotary Wing Database
Description: Cost, technical, and programmatic data for historical Navy and Army helicopter programs.
Automation: TBD

Publication: Technical Report—Database Documentation

Keywords: Data Collection

NAVAIR-11

Title: Propulsion Database

Summary: A database of historical propulsion cost, technical, and programmatic data is being developed. The database is being constructed to respond to ad hoc queries and to provide standard format reports.

Classification Unclassified

Sponsor: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Performer: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161

Resources: FY Dollars Staff-years
00 \$100,000 .75

Schedule: Start End
Dec 99 Sep 00

Data Base: Title: Propulsion Database
Description: Cost, technical, and programmatic data for historical propulsion programs.
Automation: TBD

Publication: Technical Report—Database Documentation

Keywords: Data Collection

NAVAIR-12

Title: Environmental Costs of Hazardous Operations (ECHO) Model

Summary: Perform a verification/validation of the ECHO model, which was developed by Tecolote. The model calculates the environmental costs incurred throughout the life cycle of a program. Costs include hazardous material purchase; hazardous material tracking, handling and storage; hazardous waste disposal; hazardous waste management; wastewater treatment; air emissions control; air emissions monitoring and reporting. The model will be populated with data for various weapons systems. New CERs will be

developed to relate the data streams to the environmental costs. Changes to the model will be made to make it more user friendly and to allow easy tracking of input data.

Classification: Unclassified
Sponsor: Naval Air Systems Command
22347 Cedar Point Road, Unit 6
Patuxent River, MD 20670-1161
Performer: Naval Air Warfare Center Aircraft Division
Lakehurst, NJ 08733
Resources: FY Dollars Staff-years
00 \$130,000
Schedule: Start End
Dec 99 Oct 00
Data Base: Title: N/A
Description:
Automation:
Publication: Validation Report, Software Users Manual
Keywords: Environmental, CER

NAVAIR-13

Title: Analysis of Alternatives (AoA) Evaluation Tool
Summary: AIR 4.2.4 Weapons Division continues its involvement in the formal AoA process and other analysis evaluating alternatives for weapon systems. The number of alternatives in an analysis is not set by policy, but typically ranges from a few to many (5 to 20). The AoA Evaluation Tool is an Excel-based tool used to organize and standardize the process used in the evaluation of each alternative. The tool assists the analyst in normalizing data for inflation, quantity, and learning and rate improvement curves.
Classification: Unclassified
Sponsor: Various
Naval Air Warfare Center Weapons Division
China Lake, CA 93556
Performer: Naval Air Warfare Center Weapons Division
Cost Analysis Department
China Lake, CA 93556
Resources: FY Dollars Staff-years
99 \$150,000 1.0 MMC
99 \$200,000 1.4 JDAM PIP
Schedule: Start End
Aug 99 Sep 00 MMC
Oct 99 Aug 00 JDAM PIP
Data Base: Title: N/A
Description:
Automation:
Publication: Cost Analysis section of technical report.
Keywords: Analysis, Weapon Systems, Computer Model

NAVAIR-14

Title: Missile Database

Summary: This task is to develop a PC-based relational database to store unclassified missile data. Actual cost, programmatic, and technical data will be included. The ability to query the database will be built into the system. This effort involves the collection of data and costs necessary to build more detailed cost estimating relationships (CERs) that can be used to provide both data and estimating support to NAVAIR 4.2 analysts.

Classification: Unclassified

Sponsor: Naval Air Systems Command
22347 Cedar Point road, Unit 6
Patuxent River, MD 20670-1161

Performer: Naval Air Warfare Center Weapons Division
Cost Analysis Department
China Lake, CA

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	99	\$87,000	.8

Schedule:	<u>Start</u>	<u>End</u>
	Nov 99	Oct 00

Data Base: *Title:* Missile Database

Description: Missile cost, technical, and programmatic data.

Automation: Microsoft ACCESS application

Publication: Functional Requirements, System Specifications

Keywords: Estimating, Analysis, Database, CERs, Missiles, Weapon Systems

Naval Sea Systems Command (NAVSEA)

Name:	Cost Engineering and Industrial Analysis Division, Comptroller Directorate Naval Sea Systems Command		
Address:	2531 Jefferson Davis Highway Arlington, VA 22242-5160		
Director:	Mitchell B. Waldman (703) 602-1209 Jerome R. Acks, (703) 602-1209		
Size:	Professional:	56	
	Support:	2	
	Consultants:	0	
	Subcontractors:	16	
Focus:	O&S Cost Estimating; Total Ownership Cost Estimating; Commonality and Standardization of Ship Design and Construction Processes and of Ship Components or Sub-assemblies (impact on acquisition and O&S costs); Build Strategy Impact on Ship Costs; Ship Design Trade-Off Analysis Tools; Ship and Weapon System Cost Modeling		
Activity:	Number of projects in process:	5	
	Average duration of a project:	2 ½ years	
	Average number of staff members assigned to a project:	1	
	Average number of staff-years expended per project:	1 1/2	
	Percentage of effort conducted by consultants:	90%	
	Percentage of effort conducted by subcontractors:	20%	

NAVSEA-1

Title:	Material Vendor Survey		
Summary:	The objective of this annual survey is to capture future price trends and last year's actual price change for material used in Navy ship construction. The survey samples over 900 shipboard material and equipment suppliers, requesting their price changes for the current year and their projections of future price changes for the next two years. The results are grouped according to Ship Work Breakdown Structure (SWBS- Cost Groups 1-9), and indices are calculated.		
Classification:	Unclassified		
Sponsor:	Naval Sea Systems Command (SEA 0177) 2531 Jefferson Davis Highway Arlington, VA 22242-5160 Janet Alberts, (703) 602-9150 x145; DSN: 332-9150 x145		
Performer:	Naval Shipyard Norfolk Det. NAVSEA Shipbuilding Support Office 3751 Island Avenue, 3 rd Floor Philadelphia, PA 19153 Joe Neumann		
Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	Each year	\$125,000	

Schedule: Start End
 Oct each year Sep each year

Data Base: End use is MATCER Data File update. Backup data is maintained at NAVSHIPSO.

Publications: None

Keywords: Industry, Estimating, Ships, Material, WBS, Economic Analysis, Survey

NAVSEA-2

Title: CVNX Total Ownership Cost Database, Model, and Process Development

Summary: This project is aimed at developing the data, tools and processes for measuring the Total Ownership Cost (TOC) changes caused by design and programmatic decisions. TOC is defined as all costs associated with the research, development, procurement, operation, logistical support and disposal of an individual weapon system including the total supporting infrastructure that plans, manages and executes that weapon system program over its full life. TOC includes the cost of requirements for common support items and systems that are incurred because of introduction of that weapon system. It excludes indirect "non-linked" Navy and DoD infrastructure costs that are not affected by individual weapon systems' development, but does include variable indirect costs that are directly linked to NAVY infrastructure. In addition to the process, the project will develop tools necessary for implementation. This will include mapping ship manpower documents, and equipment in the NAVY OARS database to the NAVY'S standard ship work breakdowns structure. The VAMOS, OSCAM, and COMET Models will be upgraded to incorporate the data and models developed as part of this program. Currently the project has the capability to portray TOC costs at the system level and is completing several modeling efforts.

Classification: Unclassified. *Proprietary* and *Business Sensitive* information will be captured and/or developed during the study but will be protected from disclosure.

Sponsor: Naval Sea System Command (SEA 017)
 2531 Jefferson Davis Highway
 Arlington, VA 22242-5160
 Irv Chewning/Steve Moretto, (703) 415-4815/4812

Performers: NSWC Carderock, PERA CV, Naval Center For Cost Analysis, Nswc Dahlgren, NUWC, Nicos Advanced Marine, Tecolote Research, Mr. Stephen J. Moretto-IPT leader

Resources: FY Dollars Staff-years
 1994 \$35,000
 1995 \$75,000
 1996 \$75,000
 1997 \$90,000
 1998 \$100,000
 1999 \$100,000
 2000 \$100,000

Schedule: Start End
 Mar 94 Dec 01

Data Base: Database will support development and improvement of TOC, operations and support cost models. The data base will consist of Acquisition, Manpower, Intermediate, Organizational and Depot Level Aircraft Carrier cost data organized at the first, second levels and third levels of the standard ship work breakdown structure

Publications: TBD

Keywords: Industry, Estimating, Ships, Overhead/Indirect, Data Collection, Mathematical Modeling, Analysis, Estimating, Review/Monitoring; Weapon Systems, Aircraft, Ships, Land Vehicles, Electronic/Avionics, Facilities, Infrastructure; Life Cycle; WBS, Fixed Costs, Variable Costs, Readiness, Modification; Economic Analysis; Data Base, Method, Computer Model. Government, Production, Labor, Operation and Support, Cost, Statistics/Regression, Study, CER.

NAVSEA-3

Title: Theater Surface Combatant (TSC) Technology Refresh Cost Model

Summary: Under PEO-TSC policy and guidance for commercial and non-developmental item selection, acquisition, integration, and life cycle support, modeling plays a critical part in planning and budgeting. The objective of this cost research initiative is to adapt existing processes employed by NAVSEA Crane in commercial technology management to determine when and how often to conduct technology refreshes to Theater Surface Combatant systems. Those processes use a model of engineering activity associated with a technology refresh change and the labor and material costs at various levels of detail. The model will help to predict when various commercial parts will change and calculate when to make bridge buys to support the items through planned technology refreshes. It will interface with other TSC models relative to sparing requirements and eventually expand to include assessment of non-commercial components as candidates for commercial technology insertion initiatives.

Classification: Unclassified

Sponsor: Department of the Navy
Program Executive Office for Theater Surface Combatants
2531 Jefferson Davis Highway
Arlington, VA 22242-5165

Performer: Naval Sea System Command
Crane Division (Code 6022)
300 Hwy 361
Crane, IN 47522-5060

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	1999	\$200,000	
	2000	\$100,000	
	2001	TBD	
	2002	TBD	

Schedule:	<u>Start</u>	<u>End</u>
	Oct 98	Oct 03

Data Base: A database of commercial product supportability factors is used to provide key elements used by the cost model. The database is in Microsoft Access format and accessed via a Visual Basic interface. It is available through a local area network at NAVSEA Crane.

Publications: None to date

Keywords: Government, Estimating, Budgeting, Ships, Weapon Systems, EMD, Production, Operations and Support, Labor, Material, Engineering, Acquisition Strategy, Risk/Uncertainty, Sustainability, Modification, Data collection, Survey, Data Base, Computer Model

NAVSEA-4

Title: "System of Systems" Technology Refresh Cost Model

Summary: NAVSEA Crane has leveraged off of existing cost estimating and model efforts relative to electronics technology refresh to develop a beta version of a model to generate a high level estimate of an aggregate of multiple military systems at the platform and battlegroup level. The goal of the modeling effort is to assist platform managers to establish budget thresholds for sustainment of systems' functionalities under today's ever-changing commercial marketplace. The "system of systems" model has been developed using parametric estimating techniques to "model the existing model" used by NAVSEA Crane for technology refresh engineering changes. The beta version uses a small sampling of cost estimates for various system-level solution Scenarios and returns high level elements for budgeting. Continued work will expand this data set, improve the statistical analysis in the model and verify estimates with historical technology refresh costs.

Classification: Unclassified

Sponsor: NAVSEA 53

Performer: Naval Sea System Command
Crane Division (Code 6022)
300 Hwy 361
Crane, IN 47522-5060

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
2000	20K	
2001	150K	

Schedule:

<u>Start</u>	<u>End</u>
2000	2001

Data Base: Microsoft Excel was used to capture the sampling of technology refresh costs and applicable parameters for establishing cost estimating relationships. The Excel spreadsheets were copied into ACEIT and CoSTAT was used to build appropriate CERs.

Publications: None to date

Keywords: Government, Estimating, Budgeting, Ships, Weapon Systems, Electronics, EMD, Production, Operations and Support, Engineering, Acquisition Strategy, Risk/Uncertainty, Sustainability, Modification, Mathematical Modeling, Data Base, CER

NAVSEA-5

Title: Technology Assessment and Management (TeAM) Cost Analysis

Summary: Technology Assessment and Management (TeAM) is an initiative by NAVSEA Crane to assess opportunities for reducing total ownership costs to the Navy by 1.) analyzing older methods of weapon systems operations within the U.S. fleet with equivalent commercial methods and 2.) identifying such equipment that is used in multiple applications by various platforms. The cost of implementing feasible solutions and it's impact upon current total ownership costs is a key factor in this assessment. A partnership between NAVSEA Crane and Raytheon Technical Services is pulling together tools available in the form of prepackaged software and existing cost models developed in-house to generate estimates of engineering change, system total ownership cost and return on investment ratios. These tools are being integrated into a seamless process of analysis that draws upon various available knowledge bases of performance, supportability and ownership cost parameters. The output reports of the process will be web-accessed and tailored to a program's desired format for business case analysis.

Classification: Unclassified

Sponsor: Office of Naval Research

Performer: Naval Sea System Command
Crane Division (Code 6022)
300 Hwy 361
Crane, IN 47522-5060

Raytheon Technical Services
Indianapolis, IN

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	1999	250K	
	2000	250K	

Schedule:	<u>Start</u>	<u>End</u>
	Dec 99	Sep 00

Data Base: Data for analysis will be captured and maintained via knowledge bases, in a format yet to be determined. Data warehousing will be used to integrate various tools to the analytical process.

Publications: None to date

Keywords: Government, Analysis, Estimating, Budgeting, Ships, Aircraft, Weapon Systems, Electronics/Avionics, EMD, Production, Operations and Support, Engineering, Acquisition Strategy, Risk/Uncertainty, Readiness, Reliability, Sustainability, Integration, Modification, Case Study, Mathematical Modeling, Data Base, CER, Expert System

Naval Surface Warfare Center, Dahlgren Division (NSWCDD)

Description and summaries not submitted.

Naval Surface Warfare Center, Carderock Division (NSWCCD)

Name:	Systems Engineering and Analysis Department, Code 21 Cost and Economic Analysis Office, Code 211 Naval Surface Warfare Center, Carderock Division	
Address:	9500 MacArthur Boulevard West Bethesda, MD 20817-5000	
Director:	John C. Trumbule	
Size:	Professional:	9
	Support:	2
	Consultants:	0
	Subcontractors:	4
Focus:		
Activity:	Number of projects in process:	20
	Average duration of a project:	2
	Average number of staff members assigned to a project:	2
	Average number of staff-years expended per project:	4
	Percentage of effort conducted by consultants:	0
	Percentage of effort conducted by subcontractors:	20%

NSWCCD-1

Title: Product-Oriented Design and Construction (PODAC) Cost Model

Summary: This cost model will incorporate a Product Work Breakdown Structure and be sensitive to changes in shipbuilding strategies, ship construction process, use of common modules, zonal architectures, and equipment standardization. It will assist in assessment of the cost and affordability of design commonality alternatives that have potential for reducing acquisition and ownership costs of ships in conjunction with the NAVSEA Affordability Through Commonality (ATC) Program, the NAVSEA Ship Concept Advanced Design R&D Program and the Mid-Term Sealift Ship Technology Development Program (MTSSTDP). Concept exploration phase was completed with selection of a baseline from conceptual models developed by cost research projects—Development of Product-Oriented Cost Estimating Tools and Near-Term Prototype PODAC model. Partial functionality of the model was demonstrated in February 1997. Version 6.0 has been installed and implemented, by an integrated product team composed of Navy, shipyard personnel, and model developers, at the four surface shipyards and at NSWCCD. Cost model validation testing has been performed at two shipyards. A Data Analysis capability was added during FY 99, and is being evaluated at the shipyards. The focus of the cost model development is now primarily to support engineering tradeoff studies.

Classification: Unclassified

Sponsor: Naval Sea System Command (SEA 05R2)
2531 Jefferson Davis Highway
Arlington, VA 22242-5160

Performer: Carderock Division, Naval Surface Warfare Center (Code 21)
9500 MacArthur Boulevard
West Bethesda, MD 20817-5700
John Trumbule, (301) 227-5570; DSN: 287-5570
Robert Jones (310) 227-4012; DSN: 287-4012

Designers & Planners, Inc.; SPAR, Inc.; University of Michigan Transportation Research Institute; Avondale Shipbuilding, Inc.; Bath Iron Work, Inc.; Ingalls Shipbuilding, Inc.; National Steel and Shipbuilding Company; and Newport News Shipbuilding

Resources: FY Dollars Staff-years

Prior FY	\$295,000	
96	\$990,000	
97	\$862,000	
98	\$800,000	
99	\$750,000	
00	\$550,000	

Schedule: Start End

Sep 94	Sep 95	Concept Exploration
Oct 95	Feb 97	Prototype Dem/Evaluation
Apr 97	Apr 98	Model Installation/Implementation at shipyards
Apr 99	Sep 00	Life Cycle Cost Capability
Apr 99	Dec 00	Engineering Tradeoff studies/ Model Evaluation

Data Base: Resident within cost model

Publications: *Production-Oriented Design and Construction (PODAC) Cost Model Plan of Action and Milestones and Functional Specification (FY 96)*

Cost Estimating Relationships Development Plan (1997)

PODAC Cost Model Validation Plan (1997)

Product-Oriented Design and Construction Cost Model (1998)

Product-Oriented Design and Construction Cost Model – An Update (1999)

Keywords: Government, Estimating, Ships, Production, Labor, Material, Overhead/Indirect, Engineering, Manufacturing, WBS, Case Study, Survey, Cost/Production Function, Method, Mathematical Model, Study

NSWCCD-2

Title: Navy Force Affordability Model (NFAM)

Summary: This model replaces the previous NFAM and the Dynamic Investment Balance Simulator (DIBS). It relates future Navy force structures and budgets. It has two principal modes of operation. The first, derived from previous versions of NFAM, calculates budgets based on the user's input of force structure plans, including retirements and new procurements. The second, derived from DIBS, uses a goal-seeking algorithm to determine force structures based on the user's input of budgets. A third, hybrid, mode combines these capabilities, so that force structure decisions may be specified for some systems and not for others. In all modes, the model tracks force structure decisions and funding needs at the SASDT category level as well as the ship class or aircraft type/model/series (T/M/S) level. In the goal-seeking mode, the model allows examination of tradeoffs between acquisition (future force structure) and O&S (maintaining current force structure) in a range of funding environments. The model is also capable of exploring more explicit tradeoffs within limited acquisition categories. The procurement decision algorithm strives to maintain the 'shape' of the force (relative numbers of various platform types) in the event that budgets are inadequate to meet the stated goals. A separate but related macroeconomic model capable of generating a range of future Navy funding streams was also developed under this effort. The DIBS model has been successfully demonstrated (FY93), and previous versions of NFAM have supported a variety of studies. Proposals have been submitted for further development and enhancements. NCCA-27 is related to this project.

Classification: Database—Secret; Model—Unclassified

Sponsor: Currently unfunded (FY00)
 Chief Naval Operations (Code N815) (FY99)
 The Pentagon (Navy Annex)
 Washington, DC 20310
 CDR Robert Kallio, (703) 697-0614
 ASN (RDA) Acquisition Reform Office (FY96-98)
 Chief Naval Operations (Code N812) (FY92-95)
 The Pentagon
 Washington, DC 20310
 Matt Henry, (703) 697-5242

Performer: Carderock Division, Naval Surface Warfare Center (Code 21)
 9500 MacArthur Boulevard
 West Bethesda, MD 20817-5700
 Daniel Platt, (301) 227-2454, DSN: 287-2454;
 Michael F. Jeffers, Jr., (301) 227-1941; DSN: 287-1941;
 Anna Wegman, (301) 227-5082; DSN: 287-5082
 Dahlgren Division, Naval Surface Warfare Center (Code T52)
 Dahlgren, VA 22448-5000
 Steven Harmon, (540) 653-2111, DSN: 249-2111;
 Eric Rocholl (T51), (540) 653-5236, DSN: 249-5236

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
Prior FY	\$390,000	2.5
97	\$0	0
98	\$50,000	0.3
99	\$20,000	0.1

Schedule:

<u>Start</u>	<u>End</u>
Feb 93	TBD
Nov 93	DIBS Prototype
Apr 95	DIBS Enhancements
Sep 95	New Relationships, Excel 5.0 (both NFAM and DIBS)
Mar 98	New NFAM, combines old NFAM and DIBS DIBS
Mar 99	Updates to Database; Enhancements

Data Base:

Title:	NFAM Data Base
Description:	Model contains a force structure database derived from the SASDT and Ship Management Information System, O&S cost factors derived from VAMOS-Ship/Air, maintained in Excel. To remain current, databases are periodically updated.
Automation:	Microsoft Excel Spreadsheet

Publications: Draft reports of DIBS model and operation. Relationships documented in briefing form.

Keywords: Government, Analysis, Policy, Programming, Budgeting, Weapon Systems, Life Cycle, Acquisition Strategy, Risk/Uncertainty, Mathematical Modeling, Statistics/Regression, Mathematical Model, Computer Model

NSWCCD-3

Title: Aircraft Carrier Technology Economic Analysis Model (TEAM)

Summary: TEAM was used to evaluate proposed aircraft carrier technologies (or proposed processes) from a cost and economic perspective. TEAM evaluates cost and economic

impacts to insert one or more technologies into: (1) one or more future aircraft carriers ("forward-fit"), (2) one or more existing aircraft carriers ("back-fit") or (3) both future and existing aircraft carriers.

TEAM calculates five cost and economic measures-of-merit for a technology (or system of technologies): Life Cycle Cost, Return on Investment (ROI), Net Present Value (NPV), Benefit Cost Ratio (BCR) and Payback Period. TEAM calculates Life Cycle Cost and ROI are estimated using cost accounting techniques. NPV, BCR and Payback Period are estimated using engineering economic techniques (i.e. time-value-of-money).

TEAM requires the following inputs from the user: (1) designation of existing carriers that are back-fit candidates, (2) designation of future carriers that are forward-fit candidates, (3) Non-recurring "up front" investment and (4) recurring life cycle costs associated with each technology insertion. TEAM can be easily adapted to perform the same function for other Navy and non-Navy platforms.

Classification: Model is Unclassified; Some Cost Data is Business Sensitive

Sponsor: Future Aircraft Carrier Program Office (PMS 378)
2711 Jefferson Davis Highway, AP1 Suite 9000
Arlington, VA 22202

Irv Chewning (NAVSEA 017), (703) 415-4815
Nedak Sumrean (NAVSEA 017) (703) 415-4816

Performer: Carderock Division, Naval Surface Warfare Center (Code 21)
9500 MacArthur Boulevard
West Bethesda, MD 20817-5700
Marc Greenberg, (301) 227-4716; DSN: 287-4716

Resources: FY Dollars Staff-years
99 \$40K 0.3

Schedule: Start End Task
Jul 99 Nov 99 Model Specification, Development and Evaluation

DataBase: Resident within cost model; some data "Business Sensitive"

Publications: None

Keywords: Life Cycle, Estimating, Ships

NSWCCD-4

Title: LEAPS Cost Support

Summary: Incorporate cost estimating and analysis capability into the Leading Edge Advanced Prototyping for Ships (LEAPS) integrated data environment. For selected cost analysis models, (1) provide lists defining the input variables required by the models, (2) provide definitions of the input variables, (3) provides lists defining the output information generated by the models, (4) provide definitions of the output, (5) support the focus object model from a cost perspective, (6) support the development of wrappers, and (7) document all results.

Classification: Unclassified

Sponsor: Myles Hurwitz, NSWCCD Code 26, (301) 227-1927, hurwitzmm@nswccd.navy.mil

Performer: Carderock Division, Naval Surface Warfare Center (Code 21)
9500 MacArthur Boulevard
West Bethesda, MD 20817-5700
Chris Whitacre, (301) 227-3003; DSN: 287-3003

Resources: FY Dollars Staff-years
 2000 \$50,000 0.3

Schedule: Start End Task
 April 00 Sep 00 Cost Model Inventory
 April 00 Sep 00 Input variable list and definitions
 April 00 Sep 00 Output information list and definitions
 April 00 Sep 00 IPT participation
 April 00 Sep 00 Focus object model development
 April 00 Sep 00 Wrapper Support (Software development)
 April 00 Sep 00 Document Results

Data Base: Resident within cost model

Publications: "Leading Edge Advanced Prototyping for Ships (LEAPS): An Integrating Architecture for Early Stage Ship Concept Assessment Software," 2nd ASNE Modeling, Simulation, and Virtual Prototyping Conference, Arlington, VA, Nov. 24-25, 1997, pp.135-141

Keywords: Government, Estimating, Ships, Mathematical Model

Air Force Cost Analysis Agency (AFCAA)

Name:	Air Force Cost Analysis Agency		
Address:	1111 Jefferson Davis Highway Suite 403 Arlington, VA 22202-4306		
Director:	Mr. Joseph T. Kammerer, (706) 697-5312 Mr. John Dorsett, Technical Director, (703) 602-7674 Ms. Deborah Cann, Research Chief, (703) 604-0402		
Size:	Professional:	57 (authorized); 43 (assigned)	
	Support:	4	
	Consultants:		
	Subcontractors:		
Focus:	The Air Force Cost Analysis Agency supports the Air Force by providing thorough, effective independent cost analyses and special studies in support of weapon system programs. We provide quality analyses through research to develop superior analytical tools, models and databases.		
Activity:	Number of projects in process:	17	
	Average duration of a project:	1 year	
	Average number of staff members assigned to a project:	1	
	Average number of staff-years expended per project:	0.2	
	Percentage of effort conducted by consultants:	100%	
	Percentage of effort conducted by subcontractors:	0%	

AFCAA-1

Title: ACE-IT /CO\$TAT Enhancements

Summary: ACE-IT

The purpose of this project is to continue to upgrade the current capabilities of ACE-IT. These improvements includes Dynamic Equations which will allow for multiple equation columns in an ACE session. Columns will then be referenced with their own ID or variables and the row/column intersections will be referenced using notations with a "dot" notation. Other planned improvements include implementing a Tree View of the WBS which will simplify WBS editing and debugging of indenture problems, and simplify navigation of session and methodologies.

CO\$TAT

The primary purpose of this effort is to finish hosting CO\$TAT cost analysis statistics and regression functions within an Excel spreadsheet. The end result will use an Excel GUI to drive the current CO\$TAT calculation and reporting engine. Since the primary interface will be based on Excel functionality, this effort will improve the use of CO\$TAT, incorporating better data manipulation and graphing functions as well as providing significant user interface improvements such as tabbed workbooks, zoom control, etc. In addition, this effort will also result in improved interoperability between CO\$TAT and ACDB.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: Tecolote Research, Inc.

Resources:	<u>FY</u>	<u>Dollars</u>
Past Improvements:	93-5	\$646,000
Improvements:	96-8	\$410,000
Enhancements:	99	\$170,000
Follow on Effort:	00	\$220,000
Follow on Effort:	01	\$150,000

Schedule:	<u>Start</u>	<u>End</u>
Improvements:	Jan 97	Sep 98
Enhancements:	Oct 98	Sep 99
Follow on Effort:	Oct 99	Sep 01

Database: N/A

Publications: ACE-IT user manuals and supporting documentation

Keywords: Industry, Government, Estimating, Analysis, Weapon Systems, Life Cycle, Method, Computer Model

AFCAA-2

Title: ACDB Improvements

Summary: The Automated Cost Database tool provides AFCAA with a standardized database tool that meets user needs is currently used in the Air Force/Army Missiles database. The purpose of this subtask is to improve overall user efficiency by enhancing the Functionality of the existing ACDB Database Administration (DBA) module and Database Entry (DBE) module. This task will also assist DBAs with importing existing databases into new the version and with performing data integrity and validation. This task is currently broken into two separate subtasks. The first subtask will develop, code, and test the capability for handling attached files and documents within the task level description fields. This effort will provide access to graphics, Word documents, Excel workbooks, PowerPoint files, as well as provide access to electronic CARD images. The second subtask functionality will be added for handling lower-level definitions. These include definitions for WBS, CES, technical characteristics, mapping and normalization methods. Once the improvements are made AFCAA will hold a joint review with USACEAC and other database builders and users.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research & Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: Tecolote Research, Inc.

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
(Previously included within ACE-IT funding.)			
	00	\$50,000	
	01	\$50,000	

Schedule:	<u>Start</u>	<u>End</u>
	Oct 00	Sep 01

Database: ACDB

Publications: Final Report

Keywords: Government, Estimating, Analysis, Life Cycle, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-3

Title: Military Aircraft Data and Retrieval (MACDAR) System Update

Summary: The objective of this project is to normalize and fully document previously collected Air Force and Navy cost and technical data. The database will be flexible enough to allow for either an analogy-based or CER-based approach for both recurring and non-recurring costs of aircraft systems. The database will contain functional hourly and cost information as well as technical information for each hardware WBS element. Sources of data and normalization rationale will be completely documented. FY00 efforts include extending the database to include the F-18E/F, and identification, re-normalization, and additional data collection to repair data shortages in the Material cost categories. FY01 efforts will include continuing to add F-18E/F data as well as repairing holes in the material costs of the F-15, F-14 and F-16.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: Phase I RAND
Phase II Tecolote Research Inc.
Phase III-VI Naval Air Systems Command

Resources:

	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
Phase I	93	\$100,000	
Phase II	96	\$225,000	
Phase III	97	\$25,000	
Phase IV	99	\$80,000	
Phase V	00	\$120,000	
Phase VI	01	\$100,000	

Schedule:

	<u>Start</u>	<u>End</u>
Phase I	Complete	
Phase II	Complete	
Phase III	Apr 98	Oct 98
Phase IV	Oct 98	Sep 99
Phase V	Oct 99	Sep 00
Phase VI	Oct 00	Sep 01

Database: Excel (pivot tables)

Publications: Written report and data dictionary.

Keywords: Government, Analysis, Estimating, Aircraft, Airframe, EMD, Production, Labor, Material, Data Collection, Data Base

AFCAA-4

Title: NAFCOM (NASA/Air Force Cost Model)

Summary: This project develops and integrates specific AF requirements into the NASA Cost Model. The incorporation of AF requirements allows data and cost estimates to be displayed, analyzed, and used in a manner compatible with AF terminology and costing procedures. Phase II included incorporating Air Force specific cost drivers into the Complexity Generator development process. Phase III incorporated phasing, risk analysis, and further generation of complexity factors from Phase II. Phase IV allowed the completion and delivery of the next version of NAFCOM, and added additional features and utilities that will be contained in a subsequent release of the model. This task includes continuation and completion of the NAFCOM complexity generator, which provides fidelity into the technical cost drivers by major subsystem. The FY99 project

included developing sound methodologies for separating hardware and software costs. Phase V for FY00 includes continuation of the complexity generators including propulsion and control and data handling subsystem parameters. Phase VI for FY01 includes continuation for the remaining complexity generators and will also include new data collection. This task shall also provide AFCAA with cost model technical support and updated model documentation.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research & Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: SAIC

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
Phase I	96	\$150,000	
Phase II	97	\$150,000	
Phase III	98	\$150,000	
Phase IV	99	\$150,000	
Phase V	00	\$160,000	
Phase VI	01	\$160,000	

Schedule:	<u>Start</u>	<u>End</u>
Phase I		Complete
Phase II		Complete
Phase III		Complete
Phase IV		Complete
Phase V	Oct 99	Sep 00
Phase VI	Oct 00	Sep 01

Database: NAFCOM Database

Publications: Normalized Database and NAFCOM Documentation

Keywords: Government, Estimating, Space Systems, Analysis, Life Cycle, Spares/Logistics, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-5

Title: ACDB Missile Database Improvements

Summary: The objective of this project is to collect the necessary data to perform periodic updates of the Automated Cost Data Base (ACDB) to include 665 CCDB reports on missile programs. AFCAA and US Army CEAC fund this project on an alternating FY basis. For FY99, CEAC will provide funds to collect and incorporate new missile cost data from CCDBs, CPRs, contracts, or other sources into the Joint Service Missile Database which will improve the capability of the cost analysts to estimate the cost of missile systems.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Army Cost and Economic Analysis Center (CEAC)
Ms. Patrice Jones, (703) 604-0412; DSN: 664-0412
E-mail: Patrice.Jones@pentagon.af.mil

Performer: Tecolote Research, Inc.

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
Phase I	97	\$165,000	
Phase II	98	\$100,000	
Phase III	99	CEAC	

	Phase IV	00	\$100,000
	Phase V	01	CEAC

Schedule:

	<u>Start</u>	<u>End</u>
Phase I	May 97	Apr 98
Phase II	Apr 98	Oct 98
Phase III	Oct 98	Sep 99
Phase IV	Oct 99	Sep 00
Phase V	Oct 00	Sep 01

Database: Title: Missile Automated Cost Data Base (ACDB)
Description: Missiles and Munitions systems data
Automation: PC in FoxPro

Publications: User Manuals

Keywords: Government, Analysis, Programming, Forces, Mathematical Modeling, Computer Model, Life Cycle, Labor, Material, Data Collection, Data Base, Missiles

AFCAA-6

Title: Air Force Total Ownership Cost (AFTOC)

Summary: AFTOC has expanded upon the Visibility and Management of Operating and Support Costs (VAMOSOC) management information system. Costs are reported for all appropriations for aircraft and space systems. Commodity level detail (by National Stock Number, MSD and GSD) is available for aircraft, by base and MDS, as well as for many subsystems. Munition expenditure costs are now included as well as small missile expenditure and sustainment costs. Indirect costs are reported by installation. For registered users, standard data products are available on the AFTOC web site and a user accessible multidimensional database can be reached through an Excel plug-in. The registration page can be found at aftoc.hill.af.mil.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Force Analysis Division
Mr. Scott Belford, (703) 604-0462; DSN: 664-0462
E-mail: scott.belford@pentagon.af.mil

Performer: Battelle Memorial Institute, Litton-TASC, and OO-ALC/TISMD

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
98	\$425,000	
99	\$3,749,000	
00	\$3,427,000	
01	\$3,551,000	

Schedule:

	<u>Start</u>	<u>End</u>
Phase I	Dec 97	Sep 98
Phase II	Oct 98	Mar 99
Phase III	Apr 99	Sep 99
Phase IV	Oct 99	Sep 00
Phase V	Oct 00	Sep 01

Database: MS Access, Oracle, and SQL Server 7

Publications: TBD

Categories: II.A.2, II.C

Keywords: Government, Reviewing/Monitoring, Aircraft, Space Systems, Missiles, Operations and Support, Labor, Material, Data Collection, Data Base, Infrastructure

AFCAA-7

Title: Independent Verification and Validation (IV&V) of the Air Force Total Ownership Cost (AFTOC) System

Summary: The AFTOC system provides Department of Defense users cost information for weapon systems and installation. Standard data products are available to approved users on the AFTOC website. An Excel plug-in tool called Essbase provides end user customer query capability. Source data is collected from over 14 Air Force financial and logistics systems. The contractor is tasked with testing AFTOC software applications and performing IV&V of the AFTOC databases to include metadata, and identifying potential data processing improvements.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research & Resource Management Division
Ms. Patrice Jones, (703) 604-0412; DSN: 664-0412
E-mail: Patrice.Jones@pentagon.af.mil

Performer: Logistics Management Inc. (LMI)

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
99	\$100,000	
00	\$500,000	

Schedule:

<u>Start</u>	<u>End</u>
Jul 99	Jun 01

Database: Excel

Publications: Final Report

Keywords: Government, Estimating, Analysis, Life Cycle, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-8

Title: Defense Contractor Overhead Rate Analysis

Summary: The objective of this project is to provide a primer discussing methods of measuring and predicting business base changes for a prime weapon system contractor; then describing how to calculate alternate overhead rates given different assumptions of that particular contractor's future business base. This effort will allow normalization of current wrap rates to the historical data underlying an estimate; it will also allow normalization of the historical cost data to reflect current wrap rate calculations. This study compiles past CCDR DD1921-3 information, which shows historical cost pools and direct base expenses used in calculating overhead rates, and attempts to project the trends into the future. FY98 deliverables included the following contractors: Boeing, St. Louis; Hughes; TRW; Northrop Grumman and Lockheed Martin, Orlando. Last years deliverables included Lockheed Martin Missiles and Space, Sunnyvale; Lockheed Martin, Marietta, GA; Lockheed Martin, Fort Worth; Boeing Military Aircraft, Seattle; and Raytheon Defense Systems. For FY00 the contractors that are currently being studied are in the rotary wing area, which include Bell Helicopter, Boeing Helicopter, Sikorski Aircraft, and Sanders-A Lockheed Martin Co. For FY01 the contractors that are expected to be reviewed are TRW, Lockheed Martin, Boeing, Raytheon and Northrop Grumman.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: Naval Air Systems Command

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
Phase I	98	\$160,000	
Phase II	99	\$80,000	
Phase III	00	\$80,000	
Phase IV	01	\$100,000	

Schedule:	<u>Start</u>	<u>End</u>
Phase I	Oct 97	Oct 98
Phase II	Oct 98	Sep 99
Phase III	Oct 99	Sep 00
Phase IV	Oct 00	Sep 01

Database: Excel

Publications: Stand-alone documentation on each contractor site.

Keywords: Government, Analysis, Estimating, Aircraft, Production, Labor, Material, Data Collection, Data Base

AFCAA-9

Title: Air Force Inflation Model Tool

Summary: This tool is used throughout the Air Force for making inflation conversion calculations and instructing personnel in the principles of inflation. It supports all cost analysis activities in AFCAA including aircraft weapon systems, computer, command and control, missile and munitions weapon systems, and space systems. The converter as well as the tutorial utilizes the use of Excel. The objective of this task is to support the use of the two applications described above to calculate and disseminate inflation information in a timely manner to the Air Force Secretariat, Air Staff, commands, and field operating agencies. Two areas of support include programming a custom generator report feature and updating the tool for new inflation indices.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research & Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: TASC

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	97	\$41,000	
	98	\$46,000	
	99	\$20,000	
	00	\$16,000	
	01	\$16,000	

Schedule:	<u>Start</u>	<u>End</u>
	Oct 96	indefinite

Database: Excel

Publications: N/A

Keywords: Government, Estimating, Analysis, Database, Mathematical Modeling, Computer Model

AFCAA-10

Title: Aircraft Avionics Systems Database and Study

Summary: The objective of this effort involves developing an avionics database that will be used to develop cost estimating relationships for estimating both federated and next-generation integrated avionics systems. However, the key element of the effort is to be able to make

the bridge between federated and integrated avionics systems. There is an extensive data collection effort underway including programs such as F-22, Comanche, B-2, V-22 and JSF. This database is to include cost, technical and programmatic data for a wide range of systems across many different airborne platforms. Currently this task is using both a traditional CER approach and a methodology to estimate avionics costs from the board level cost and performance descriptions. This effort is being coordinated across service lines to assist in various cost estimating tasks.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research & Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: Tecolote Research, Inc.

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
99	\$212,000		
00	\$125,000		
01	\$100,000		

Schedule:	<u>Start</u>	<u>End</u>
	Mar 99	Feb 00
	Mar 00	Feb 01
	Oct 00	Sep 01

Database: Excel

Publications: Final Report

Keywords: Government, Analysis, Electronics/Avionics, EMD, Production, Labor, Material, Data Collection, Data Base

AFCAA-11

Title: Joint Automated Information System (AIS) Automated Cost Database (ACDB) Framework

Summary: The objective of this effort is to provide support to the Air Force Cost Analysis Agency, in conjunction with DoD Automated Information System Database Working Group (Army, Navy, Software Engineering Institute, and Office of the Secretary of Defense, Program Analysis & Evaluation (OSD PA&E)), in the development of an AIS database within the ACDB framework, and to coordinate with the Working Group to define processes for ongoing data collections and database expansion.

Classification: Unclassified

Sponsor: Electronic Systems Center
Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Patrice Jones, (703) 604-0412; DSN: 664-0412
E-mail: Patrice.Jones@pentagon.af.mil

Performer: Tecolote Research, Inc.

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
99	\$200,000		
00	\$100,000		
01	\$150,000		

Schedule: Start End
 Oct 98 Sep 01

Database: IT ACDB Database

Publications: TBD

Keywords: Government, Estimating, Analysis, Life Cycle, Spares/Logistics, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-12

Title: Missile Cost Estimating Relationship (CER) Development

Summary: This project will apply new missile data from the ACDB missile database to a comprehensive update of a previous study completed in 1994 that has proven very useful in recent cost analyses. This project will also utilize data from a recent Naval Center for Cost Analysis (NCCA) missile data collection effort. This data will then be used to develop CERs, factors and analogs for various missiles and ground based radars for both RDT&E and production. Other subtasks include collecting additional missile and munitions programmatic information, providing more detailed narratives of the database content, and including the detailed spreadsheets with raw and normalized data.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
 Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
 E-mail: Eric.Plumer@pentagon.af.mil

Performer: Tecolote

Resources:

	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
Phase I	99	\$50,000	
Phase II	00	\$130,000	

Schedule: Start End
 Jan 98 Dec 99
 Jan 00 Dec 00

Database: ACDB

Publications: Updated final report showing all relevant analysis and CERs.

Keywords: Government, Estimating, Analysis, Life Cycle, Spares/Logistics, Data Collection, Database, Mathematical Modeling, Statistics/Regression, CER, Computer Model, Weapon Systems, Missiles, Training

AFCAA-13

Title: Crosslink Payloads Data Collection and CER Development

Summary: The objective of this task is to initiate an efficient cost effective data collection and database development effort for the purpose of estimating crosslinkpayloads for space systems. Continuing advances in microwave monolithic integrated circuits (MMIC) and larger more complex digital and analog integrated circuits have led to improved technologies in satellite communication and electronic systems. This project will focus on U.S military and non-military systems with a priority placed on unclassified programs. All applicable cost and technical data will be collected, the latter being most representative of the crosslink cost drivers. Accurate technology parameters are useful because they allow CERs to be developed on more than simply weight and size variables.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research & Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: SAIC

Resources: FY Dollars Staff-years
99 \$150,000

Schedule: Start End
Oct 98 May 00

Database: Excel

Publications: Final Report

Keywords: Government, Estimating, Analysis, Spares/Logistics, Life Cycle, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression

AFCAA-14

Title: Wartime Cost Per Flying Hour Analysis

Summary: In order to estimate the operating costs for weapon systems, and in particular aircraft weapon systems, the metric "cost per flying hour" is perhaps the most common cost factor currently in use. All variable costs including fuel, POL, depot level repairables, and consumables are collected, normalized, and expressed in terms of a single cost per flying hour for each weapon system. As a result, billions of dollars of annual O&M funding depends on this one critical cost factor which makes the accurate calculation all the more critical. In a wartime scenario the accurate accumulation of flying data becomes even more important; however, it has often been demonstrated that ad hoc reporting requirements are implemented haphazardly without flowing through the normal accounting systems which occurred with other flying missions including Desert Storm. This task will analyze and evaluate AFTOC data and any other data sources in order to provide an independent analysis of the feasibility of implementing alternative cost per flying hour methodologies with particular attention focused on wartime scenarios.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Patrice Jones, (703) 604-0412; DSN: 664-0412
E-mail: Patrice.Jones@pentagon.af.mil

Performer: LMI

Resources: FY Dollars Staff-years
99 \$70,000

Schedule: Start End
May 99 Jul 00

Database: AFTOC

Publications: Written Reports

Keywords: Government, Estimating, Operations and Support, Analysis, Life Cycle, Spares/Logistics, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-15

Title: Force Analysis Decision Support System (FADSS) (ACE-IT Enhancements)

Summary: The objective of this effort is to provide enhancements to ACEIT to facilitate force costing and budget analysis. This effort will provide a general-purpose framework for

combining weapon system cost estimates at a summary level into an integrated budget analysis utility. This framework will support top level annual budget drills and assist with analysis of alternative Force mixes. In addition, the model will enhance the utility of ACEIT by improving the integration of ACEIT with other Windows applications. Enhancements will be made to ACEIT Executive to provide more flexibility with using ACE sessions from within Excel. To the extent funding is available, other specific enhancements will be made to CO\$TAT and ACE.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: Tecolote Research, Inc.

Resources: FY Dollars Staff-years
00 \$75,000

Schedule: Start End
Oct 99 Sep 00

Database: Product updates shall be included in scheduled ACEIT releases to ensure proper integration between multiple ACEIT development efforts and to reduce distribution expenses.

Publications: Updates to User's Guides may be distributed in electronic or paper format, as required.

Keywords: Industry, Government, Estimating, Analysis, Weapon Systems, Life Cycle, Method, Computer Model

AFCAA-16

Title: COTS Electronics Database/Modeling

Summary: The purpose of this project is to continue developing a cost database to quantify COTS hardware costs encompassing different ruggedization levels. Additional data will be collected and risk parameters will be added for increased analysis capability. In order to capture different ruggedization levels, parameters such as radiation hardness levels, vibration levels, temperature levels, and altitude levels will be analyzed to understand how these parameters impact costs. An added benefit will allow the analyst to provide augmentation to design-to-cost analyses regarding system hardness capabilities of a design using COTS components.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: Mission Research Corp. (MRC)

Resources: FY Dollars Staff-years
99 \$80,000
00 \$17,000
01 \$100,000

Schedule: Start End
Sep 99 Sep 01

Database: Excel

Publications: Final Report

Keywords: Government, Estimating, Analysis, Life Cycle, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-17

Title: Phased Array Cost Database

Summary: The objective of this task is to provide AFCAA information necessary and sufficient to estimate phased array satellite payloads for design, performance and material composition. The task will most likely use an Excel model and design attributes to incorporate new phased array data in the form of contractor resources (cost and hours), technical and programmatic data into an approved Excel format. The phase array model will be capable of storing raw contractor data, data mapping and normalization routines, mapped and normalized data, contractor specific non-standard resource data, technical data (i.e. weights, performance characteristics and material type, etc), and quantity data. It is envisioned that AFCAA analysts will use the model to incorporate data from various phased array payloads to develop analogy type estimates, parametric CERs or cost factors. Information retrieved from the model will support AFCAA's requirement to increase its cost estimating expertise.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Mr. Eric Plumer, (703) 602-9128; DSN: 332-9128
E-mail: Eric.Plumer@pentagon.af.mil

Performer: TBD

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
01	\$150,000	

Schedule:

<u>Start</u>	<u>End</u>
Oct 01	Sep 02

Database: Excel

Publications: Final Report

Keywords: Government, Estimating, Analysis, Life Cycle, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-18

Title: Commonality/Heritage Study

Summary: The objective of the study is to examine the impact to research and development dollars (i.e., potential savings) when there is commonality and heritage between satellites developed and in development.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Patrice Jones, (703) 604-0412; DSN: 664-0412
E-mail: Patrice.Jones@pentagon.af.mil

Performer: TBD

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
01	\$75,000	

Schedule:

<u>Start</u>	<u>End</u>
Oct 00	Sep 01

Database: Excel

Publications: Final Report

Keywords: Government, Estimating, Analysis, Life Cycle, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-19

Title: Sable Contingency Model

Summary: AFCAA developed a SABLE model for conducting a variety of analyses on aircraft squadron operating and support costs. AFCAA Contingency computes the costs associated with aircraft deployments under a wide variety of user-defined scenarios. Both models are data intensive containing numerous internal cost factors. The objective of this effort is to fund the required annual updates to include the required algorithm updates to reflect the changes in funding policies.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Patrice Jones, (703) 604-0412; DSN: 664-0412
E-mail: Patrice.Jones@pentagon.af.mil

Performer: TBD

Resources: FY Dollars Staff-years
01 \$40,000

Schedule: Start End
Oct 00 Sep 01

Publications: Final Report

Keywords: Government, Estimating, Analysis, Life Cycle, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-20

Title: AFI 65-503 Database Model

Summary: SAF/FMC is the OPR for the AFI 65-503 factors model. The model contains a variety of cost and planning factors that are updated annually. Some factors are obtained from external sources; many are developed internally. Currently the SAF/FMC website is the primary means of publication. The objective of the proposed effort is to develop a database that will provide a single source for storing current as well as archived factors. It will provide a quick search and custom report capabilities. The model portion will provide the templates and methodology for computing internally derived factors. Along with performing the computations the model will also provide for centralized documentation for current and archived factors.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Patrice Jones, (703) 604-0412; DSN: 664-0412
E-mail: Patrice.Jones@pentagon.af.mil

Performer: TBD

Resources: FY Dollars Staff-years
01 \$119,000

Schedule: Start End
Oct 00 Sep 01

Publications: Final Report

Keywords: Government, Estimating, Analysis, Life Cycle, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-21

Title: Air Force Planning and Projection (AFPP) Database

Summary: AFCAA annually supports the development of the Air Force Planning Projection model, which outlines the future force structure. We support this with Total Ownership Cost models on 50+ weapon systems. The data embedded in these models requires regular updates to maintain currency. In addition, we often add new weapon systems to the suite of models. The database update for FY01 will update the data for existing weapon system models and add new weapon systems.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Patrice Jones, (703) 604-0412; DSN: 664-0412
E-mail: Patrice.Jones@pentagon.af.mil

Performer: TBD

Resources: FY Dollars Staff-years
01 \$80,000

Schedule: Start End
Oct 00 Sep 01

Publications: Final Report

Keywords: Government, Estimating, Analysis, Life Cycle, Data Collection, Data Base, Mathematical Modeling, Statistics/Regression, CER, Computer Model

AFCAA-22

Title: Knowledge Management

Summary: The current work environment in most organizations, including AFCAA, is plagued with staff turnover, information overload, lack of collaboration, and a proliferation of stovepipe databases. At the request of the Deputy Assistant Secretary for Cost and Economics, AFCAA conducted market research to find companies providing assistance to organizations in the area of Knowledge Management. In Jan 00 the Agency's Research Division requested agency employees to respond to two questionnaires. The questionnaires attempted to answer two questions, "Is FMC/AFCAA ready for Knowledge Management?" and "Which business opportunities are best for FMC/AFCAA to exploit by using knowledge management?" The responses to the questionnaires have been analyzed and summarized in a report. It is envisioned that AFCAA will solicit the assistance of a contractor to consult and assist the agency in implementing a knowledge management system.

Classification: Unclassified

Sponsor: Air Force Cost Analysis Agency, Research and Resource Management Division
Ms. Patrice Jones, (703) 604-0412; DSN: 664-0412
E-mail: Patrice.Jones@pentagon.af.mil

Performer: TBD

Resources: FY Dollars Staff-years
01 \$100,000

Schedule: Start End
Oct 00 Sep 01

Publications: Final Report

Keywords: Government

Aeronautical Systems Center, Air Force Material Command (ASC/FMC)

Name:	Aeronautical Systems Center, Air Force Material Command Cost Division, Comptroller Directorate		
Address:	Building 14, Room 152 1865 4th Street Wright-Patterson AFB, OH 45433-7123		
Director:	Ms. Kathy A. Ruffner, (937) 255-6483		
Size:	Professional:	37	
	Support:	3	
	Consultants:	0	
	Subcontractors:	0	
Focus:	Cost Estimating and Research, Scheduling, Resource Analysis (Source Selection Guidance and Cost Panel Support), Earned Value Management, and integrated Risk Management		
Activity:	Number of projects in process:	2	
	Average duration of a project:	Varies	
	Average number of staff members assigned to a project:	1	
	Average number of staff-years expended per project:	.2	
	Percentage of effort conducted by consultants:	-	
	Percentage of effort conducted by subcontractors:	40%	

ASC/FMC-1

Title: Avionics Production Cost Factor Study

Summary: The primary scope of the project is to develop modern avionics support cost element factors (i.e., Systems Test and Evaluation, Peculiar Support Equipment, Systems Engineering/Program Management, Data, and Training) for programs in the Production phase of the acquisition life cycle and to test their relevancy against the ASC/RW Cost Factors Handbook (Estimating Avionics Support Element Costs with Factors). These cost factors are applied to a method that uses the percentage of element cost of an existing system to estimate the element cost of a new system. They provide a starting point for the cost estimator in preparing an estimate for a program early in the acquisition process.

Classification: Unclassified

Sponsor: ASC/FMC
Wright-Patterson Air Force Base, OH
Ms. Kathy Ruffner (937) 255-6483

Performer: ASC/YCF
Mr. John Freisthler, (937) 686-9349

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
		.33

Schedule: Completed

Data Base: ASC Cost & Schedule Data Center

Automation: Compact Disk (CD)

Keywords: Government, Estimating, Analysis, Weapon Systems, Aircraft, Airframe, Electronics/Avionics, Production, CPR/CCDR

ASC/FMC-2

Title: Automated Model for Integrating Cost Analysis with Operational Effectiveness Analysis

Summary: This effort created a PC-based tool that integrates aircraft cost and operational effectiveness analysis. The model employs optimal technique algorithms that determine measures of outcome and cost as the force mix is changed. The cost estimating relationships employed by the model are suitable for use in a concept analysis environment.

Classification: Unclassified

Sponsor: ASC/ENF
Mr. Bob Rau (937) 674-4424
Mr. Mike Seibel (ASC/FMCE) (937) 656-5477
Wright-Patterson Air Force Base, OH

Performer: Technomics, Inc. (prime)
5290 Overpass Rd, Suite 206
Santa Barbara, CA 93111
Mr. Eugene Waller

Mr. John Horak (805) 964-9894
Toyon Research Corp (subcontractor)
75 Aero Camino, Suite A
Goleta, CA 93117-3139

Mr. Mark T. Fennell (805) 968-6787 ext 158

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
90-00	\$441,470 (prime)	0
	\$275,002 (sub)	
	\$716,472	

Schedule:

<u>Start</u>	<u>End</u>
Aug 98	Dec 99

Data Bases: Data bases are included for the following models:

- Aircraft Modification Model
- UAV Cost Model
- Depot Level Repairables Model
- Digital Processor Model
- Helmet Mounted Sight Model

Keywords: Government, Estimating, Analysis, Weapon Systems, Concept Development, Automation, Economic Analysis, Data Base, Mathematical Model, Computer Model

Air Force Space and Missile Command (AFSMC)

Name:	Air Force Space and Missile System Command (AFMC/SMC) Acquisition Cost Division (SMC/FMC)		
Address:	2430 Vela Way, Suite 1467 Los Angeles AFB, CA 90245		
Director:	Mr. Anthony E. Finefield (GS-15) Chief Acquisition Cost Division (310-363-1073) Lt Col Rey S. Carpio, Deputy Chief (310-363-6770)		
Size:	Professional:	18	
	Support:	1 (Aerospace)	
	Consultants:	0	
	Subcontractors:	3 (Tecalote, EER Systems, MCR Federal)	
Focus:	Satellites, Launch, and Network & Range		
Activity:	Number of projects in process:		2
	Average duration of a project:		1 year
	Average number of staff members assigned to a project:		2
	Average number of staff-years expended per project:		0.3
	Percentage of effort conducted by consultants:		0
	Percentage of effort conducted by subcontractors:		95%

AFSMC-1

Title: FY98 Passive Sensor Cost Model Update

Summary: The methods for estimating space sensor payloads (passive sensors, e.g., infrared) need to be updated. Subsystems reviewed were: focal plane arrays; optical telescope assemblies; cryogenic coolers; servo electronics; gimbals and structures; star sensors; power supplies; and sensor integration, assembly and test.

Classification: Unclassified (Proprietary database separately bound)

Sponsor: SMC/FMC

Performer: EER Systems, Inc.
Aerospace Corporation
SMC/FMC/Phu Nguyen, (310) 363-0071

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	prior	\$880,000	0.8
	99	\$100,000	0.1

Schedule:	<u>Start</u>	<u>End</u>
	Aug 99	Aug 00

Data Base:

Title:	Sensor Database
Description:	Contains cost and technical and programmatic data by WBS at the sensor subsystem level.
Automation:	EXCEL and Access

Publications: *Passive Sensor Cost Model*, (1997) Space and Missile Systems Center/FMC

Category: II.A.2
Keywords: Government, Estimating, EMD, Space Systems, Production, WBS, CER, Statistics/Regression, Data Base, Method, Data Collection, Survey, Electronics/Avionics

AFSMC-2

Title: FY98 Unmanned Spacecraft Cost Model (USCM) Update

Summary: Update the 7th edition (1994) of the model with developing, validating, documenting new CERs, and obtaining new data points.

Classification: Unclassified (Proprietary database separately bound)

Sponsor: SMC/FMC

Performer: Aerospace Corporation
 Tecolote Research, Inc.
 SMC/FMC/Ms. Phu Nguyen, (310) 363-0071

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
prior	\$1,769,000	1.1
99	\$220,000	2.5

Schedule:

<u>Start</u>	<u>End</u>
Aug 99	Aug 00

Data Base:

Title: USCM Database

Description: Includes cost, technical, and programmatic data by WBS at the spacecraft component level.

Automation: The database is contained in Excel spreadsheets and Access database

Publications: *Unmanned Spacecraft Cost Model*, 8th edition, Space and Missile Systems Center/FMC

Categories: II.A.2, II.B

Keywords: Government, Estimating, EMD, Space Systems, Production, WBS, CER, Mathematical Modeling, Statistics/Regression, Data Base, Method, Mathematical Model

Electronics Systems Center, Air Force Material Command (ESC/FMC)

Description and summaries not submitted.

**Ministry of Defence, Special Procurement Services/Cost Forecasting
(SPS/CF)**

Name:	Special Procurement Services/Cost Forecasting (SPS/CF) An Agency of the MoD UK		
Address:	Elm 1a #187 MoD Abbey Wood Bristol BS34 8JH UK		
Director:	Mr. Geoff Hollinrake		
Size:	Professional:	66	
	Support:	2	
	Consultants:	-	
	Subcontractors:	10	
Focus:			
Activity:	Number of projects in process:	135	
	Average duration of a project:	4 months	
	Average number of staff members assigned to a project:	3	
	Average number of staff-years expended per project:	0.4	
	Percentage of effort conducted by consultants:	-	
	Percentage of effort conducted by subcontractors:	20%	

SPS/CF-1

Title: Software Support Cost Model Project (SSCMP)

Summary: The overall aim of the SSCMP is to develop a software package to enable procurers, managers and designers to estimate the costs of support for software over its in-service life. The study program started in 1995. The Main Study phase of the project is now complete and has defined the factors and effects that have an impact on software support costs, using data sets derived from 54 live, software intensive, military application projects. Following independent Expert Review the Main Study has confirmed the suggestion from the Pilot Study that size and complexity are not key factors and that age, while not a key factor, does describe a distribution of software support costs over the in-service life of software. The primary deliverables from the Main Study are; a family of algorithms to support a concept model for early prediction of software support costs under current UK Military procurement practices and a suite of guidelines to assist designers and managers in decision making and procurement strategy development. The next phase of the project is to define effective metrics collection and population to develop a scaleable model able to cope with the demands of evolving software support procurement strategies.

Classification: Unclassified

Sponsor: Specialist Procurement Services-UK MOD
Dr D Thombs, 011-44-117-913-2754

Performer: BMT Reliability Consultants Ltd., Fareham UK

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	99/01	\$250,000	1.0
Schedule:	<u>Start</u>	<u>End</u>	
	Dec 95	April 01	
Data Base:	Using Microsoft Excel and Access to store and manipulate collected data and Minitab for statistical analysis		
Publications:	Reports on specific activities, presentations, model and user guide and manager/designer guidelines.		
Keywords:	Government, Estimating, Operations and Support, Software, Computer Model		

**Air Force Institute of Technology
School of Engineering and Management (AFIT/ENG)**

Description and summaries not submitted.

Defense Systems Management College (DSMC)

Description and summaries not submitted.

The Aerospace Corporation (AERO)

Name:	Cost and Requirements Department, The Aerospace Corporation		
Address:	2350 E. El Segundo Blvd., El Segundo, CA 90245		
	Mail: M4-021, P.O. Box 92957, Los Angeles, CA 90009-2957		
Director:	Dr. Steven Glaseman		
Size:	Professional:	15	
	Support:	1	
	Consultants:	1,000 Aerospace Corp. Engineers	
	Subcontractors:	0	
Focus:	Space-system cost modeling and estimating, Relationship between requirements and cost, Cost-risk Analysis, Commercial practices, Statistical issues in cost analysis, Schedule analysis, cost/schedule/performance/design/architecture trade studies.		
Activity:	Number of projects in process:	7	
	Average duration of a project:	1 year	
	Average number of staff members assigned to a project:	2	
	Average number of staff-years expended per project:	1.0	
	Percentage of effort conducted by consultants:		
	(Aerospace Corp. engineers)	20%	
	Percentage of effort conducted by subcontractors:	0%	

AERO-1

Title:	Costs of Space, Launch, and Ground Systems		
Summary:	Historical costs of space, launch, and ground systems, including non-recurring and recurring costs of military and civil satellites and launch vehicles, payloads, launch processing, launch delays, launch failures, software, ground facilities, learning rates, cost overruns.		
Classification:	Contractor-Proprietary; Government/FFRDC Eyes Only		
Sponsor:	The Aerospace Corporation's Internal Research (IR&D) Program		
Performer:	The Aerospace Corporation, P.O. Box 92957, MS: M4-021, Los Angeles, CA 90009-2957 S. A. Book (310) 336-8655 stephen.a.book@aero.org		
Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	00	\$100,000	0.6
Schedule:	<u>Start</u>	<u>End</u>	
	FY 87	None	
Data Base:	Title:	Costs of Space, Launch, and Ground Systems	
	Description:	Contractor-Proprietary Historical Costs ("Actuals" Only)	
	Automation:	Excel Spreadsheets	
Publications:	"Costs of Space, Launch, and Ground Systems," The Aerospace Corporation, 180 Briefing Charts and Facing Page Text, April 1997.		

Category: II.A.1
Keywords: Government; Analysis; Space Systems; EMD, Production; WBS, Risk/Uncertainty, Schedule, Software; Data Collection; Data Base, Study

AERO-2

Title: Small-Satellite Subsystem Cost Model

Summary: Parametric (CER-based) cost model, including cost-risk capability, for estimating the cost of developing and producing a small-satellite bus.

Classification: Different forms of the model are releasable to government organizations (DoD, NASA, NOAA) and to contributors of proprietary cost data on small satellites.

Sponsor: Several Aerospace Corp. program offices.

Performer: The Aerospace Corporation, P.O. Box 92957, MS: M4-021, Los Angeles, CA 90009-2957. J.J. Muhle (310) 336-2672, jeffrey.j.muhle@aero.org

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
FY00	\$60,000	0.3

Schedule:

<u>Start</u>	<u>End</u>
FY90	Never

Data Base:

Title: Small-Satellite Cost Model

Description: Proprietary cost and technical data on current generation of small, low-weight, single-purpose, short-lifetime tactical, research, or experimental satellites, including military, civil, commercial, university, and foreign

Automation: Excel Spreadsheet.

Publications: "The Aerospace Corporation's Small-Satellite Cost Model", Corporate Briefing, Updated regularly.

Category: I.A, I.B.2.

Keywords: Government; Estimating; Space Systems; EMD, Production; WBS, Acquisition Strategy, Advanced Technology; Data Collection, Mathematical Modeling, Statistics/Regression; CER, Data Base, Computer Model.

AERO-3

Title: Ground Systems Cost Model

Summary: A joint project of The Aerospace Corporation's Cost and Requirements Department and The MITRE Corporation's Economic and Decision Analysis Center. A Parametric (CER-based) cost model, including cost-risk capability, for estimating the cost of developing and producing ground-system hardware and software, and the costs of operations and maintenance, including satellite control facilities and equipment, communications equipment, launch processing, and security.

Classification: Releasable to government organizations (DoD, NASA, NOAA) and to contributors of proprietary cost data on small satellites.

Sponsor: Several Aerospace Corp. program offices.

Performer: The Aerospace Corporation, P.O. Box 92957, MS: M4-021, Los Angeles, CA 90009-2957; L.B. Sidor (310) 336-1571, laurent.b.sidor@aero.org

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$10,000	0.1

Schedule: Start End
 FY94 Never

Data Base: **Title:** Ground Systems Cost and Technical Data Base

Description: Proprietary cost and technical data on ground-system hardware and software, and the costs of operations and maintenance, including satellite control facilities and equipment, communications equipment, launch processing, and security.

Automation: Excel Spreadsheet.

Publications: 1. "G-COST: Ground Systems Cost Model", Corporate Briefing, Updated regularly.
 2. G-Cost 2.0: Satellite Communication Ground Station Cost Model, MITRE Technical Report Draft, December 1998. Awaiting approval for release.

Category: II.A1, II.A.2.

Keywords: Government; Estimating; Space Systems; EMD, Production; WBS, Acquisition Strategy, Advanced Technology; Data Collection, Mathematical Modeling, Statistics/Regression; CER, Data Base, Computer Model.

AERO-4

Title: Concept Design Center

Summary: Central focal point for applying distributed concurrent-engineering methodology, utilizing broad engineering expertise and in-house cost and performance models to produce near-optimal conceptual architectures and designs for space, launch, and ground systems. Allows rapid tradeoffs of performance requirements and life-cycle costs among candidate architectures and designs.

Classification: Unclassified and classified centers exist at The Aerospace Corporation.

Sponsor: The Aerospace Corporation's Internal Research (IR&D) Program and NASA's Jet Propulsion Laboratory, where a similar facility (The "Product Design Center") was built by JPL and Aerospace.

Performer: The Aerospace Corporation, P.O. Box 92957, MS: M4-021, Los Angeles, CA 90009-2957; A.B. Dawdy (310) 336-6134 and V.M. Canales (310) 336-8350.

Resources: FY Dollars Staff-years
 00 \$590,000 3.0

Schedule: Start End
 FY97 Never

Data Base: **Title:** Existing Corporate Cost and Technical Data Bases

Description: Proprietary cost data and technical engineering and physics relationships among on performance capabilities of space launch, and ground systems.

Automation: Excel Spreadsheets transferred among 20 Linked PCs.

Publications: 1 The Concept Design Center", Corporate Briefing, Updated regularly.

Category: I.B, II.B, II.D.

Keywords: Government; Analysis; Space Systems; Concept Development; WBS, Acquisition Strategy, Advanced Technology; Mathematical Modeling, Computer Model.

AERO-5

Title: Instrument Cost Model

Summary: Parametric (CER-based) cost model, including cost-risk capability, for estimating costs of developing and producing on-board instruments of various kinds for space applications.

Classification: Different forms of the model will be releasable to government organizations (DoD, NASA, NOAA) and to contributors of proprietary data. Otherwise, the model will not be generally available.

Sponsor: NASA's Jet Propulsion Laboratory and Several Aerospace Corp. program offices.

Performer: The Aerospace Corporation, P.O. Box 92957, MS: M4-021, Los Angeles, CA 90009-2957; J.J. Muhle (310) 336-2672, jeffrey.j.muhle@aero.org.

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
FY00	\$10,000	0.1

Schedule:

<u>Start</u>	<u>End</u>
FY99	Never

Data Base:

Title: Instrument "Box-Level" Cost and Technical Data Base

Description: Proprietary cost and technical data on current generation of instruments for space applications

Automation: Excel Spreadsheet

Publications: None as yet.

Category: I.C.1, II.A.2.

Keywords: Government; Estimating; Space Systems; EMD, Production; WBS, Advanced Technology; Data Collection, Mathematical Modeling, Statistics/Regression; CER, Data Base, Computer Model.

AERO-6

Title: Production Cost Anthology

Summary: A compendium of production cost theory and mathematical formulations of it that have been used in estimating costs of space systems.

Classification: Available for public release.

Sponsor: Several Aerospace Corp. program offices.

Performer: The Aerospace Corporation, P.O. Box 92957, MS: M4-021, Los Angeles, CA 90009-2957; J.C. Latta (310) 336-2503, jean.c.latta@aero.org

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$10,000	0.1

Schedule:

<u>Start</u>	<u>End</u>
FY99	FY00

Data Base:

Title: None

Description: N/A

Automation: N/A

Publications: J.C. Latta, "Production Cost Improvement, Aerospace Corp. Technical Report, 34+v pages, May 2000.

Category: I.B.1, II.A.1, II.A.2.

Keywords: Government; Estimating; Space systems; Production; Manufacturing, fixed costs, variable costs, production rate; Mathematical modeling, cost/production function, statistics/regression; Mathematical model, cost progress curve, study.

AERO-7

Title: Space-based Optical Instrument Cost Model

Summary: Parametric (CER-based) cost model, including cost-risk capability, for estimating costs of developing and producing on-board optimal instruments for space applications

Classification: Different forms of the model will be releasable to government organizations (DoD, NASA, NOAA) and to contributors of proprietary data. Otherwise, the model will not be generally available.

Sponsor: NASA Langley Research Center and Several Aerospace Corp. Program Offices.

Performer: The Aerospace Corporation, P.O. Box 92957, MS: M4-021, Los Angeles, CA 90009-2957; J.J. Muhle (310) 336-2672, , jeffrey.j.muhle@aero.org
norman.lao@aero.org.

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
FY00	\$10,000	0.1

Schedule:

<u>Start</u>	<u>End</u>
FY99	?

Data Base:

Title: Optical Instrument Cost and Technical Data Base

Description: Proprietary cost and technical data on current generation of optical instruments for space applications

Automation: Excel Spreadsheet

Publications: None as yet.

Category: I.C.1, II.A.2.

Keywords: Government; Estimating; Space Systems; EMD, Production; WBS, Advanced Technology; Data Collection, Mathematical Modeling, Statistics/Regression; CER, Data Base, Computer Model.

The MITRE Corporation (MITRE)

Name:	The MITRE Corporation The Economic and Decision Analysis Center (EDAC)		
Address:	1820 Dolley Madison Boulevard McLean, VA 22102		
Director:	Mr. Raymond Haller, (703) 883-7196		
Size:	Professional:	130	
	Support:	7	
	Consultants:	0	
	Subcontractors:	0	
Focus:	Cost and applied economic analysis, decision analysis, acquisition analysis, program management, risk management and analysis, life cycle management, logistics engineering, business process reengineering, business and technology case analysis, and information services and technology benchmarking.		
Activity:	Number of projects in process:	180	
	Average duration of a project:	6 months	
	Average number of staff members assigned to a project:	2	
	Average number of staff-years expended per project:	0.5	
	Percentage of effort conducted by consultants:	0%	
	Percentage of effort conducted by subcontractors:	0%	

MITRE- 1

Title: C4ISR Investment Strategies

Summary: This project is developing a research roadmap for improving MITRE's methods, tools, databases, and guidance for C4ISR investment strategy decisions.

Classification: Unclassified

Sponsor: MITRE IR&D

Performer: MITRE

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	00	\$362,000	2

Schedule:	<u>Start</u>	<u>End</u>
	Apr 98	Apr 01

Data Base:

Title:	US Weapon Systems and Cost Database
Description:	A database of US weapon systems technical characteristics and costs to support C4ISR mission assessment and investment studies
Automation:	Excel initially with a migration to Access

Publications: Final reports will be written

Category: II.B

Keywords: Government, Analysis, Forces, Weapon Systems, Mathematical Modeling, Economic Analysis

MITRE-2

Title: A Decision-Logic Tree and Economic Model to Assess the Costs and Benefits of Seat Management Outsourcing

Summary: Seat management, a form of outsourcing in which information technology (IT) infrastructure assets and associated information systems (IS) support is contracted to an external provider, is becoming increasingly popular within the Department of Defense (DoD). The absence of a standard economic evaluation framework potentially creates an unacceptable level of risk and uncertainty for sponsors and may lead to sub-optimal decision-making and IT operation. The objective of this research is to thus develop a decision-logic tree and an associated computational model for evaluating the choice and the economics of seat management.

Classification: Unclassified

Sponsor: MITRE IR&D

Performer: MITRE

Resources: FY Dollars Staff-years
00 \$111,161

Schedule: Start End
Oct 99 Sept 00

Data Base: None

Publications: Final report will be written

Keywords: Industry, Estimating, Infrastructure, Demonstration/Validation, Data Collection, Survey, Case Study, Method

MITRE-3

Title: Integrating the Balanced Scorecard with Decision Analytics to Support IT Investment Decisions

Summary: MITRE and sponsors currently use the Balanced Scorecard approach (Kaplan and Norton, HBS, 1996) as a descriptive tool for understanding historical enterprise or project well-being. The objective of this research is to determine how the Balanced Scorecard can be enhanced with decision analytic methodologies to more effectively support sponsor CIO's in IT investment decision-making.

Classification: Unclassified

Sponsor: MITRE IR&D

Performer: MITRE

Resources: FY Dollars Staff-years
00 \$400,000

Schedule: Start End
April 99 Sept 01

Data Base: None

Publications: Final report will be written

Category: II.B

Keywords: Industry, Infrastructure, Demonstration/Validation, Data Collection, Survey, Case Study, Computer Model, Method

RAND Corporation (RAND)

Name:	RAND Corporation	
	Note: There is no formal cost research organization at RAND. Cost analysts are members of the management science group and, like all other research staff members, are assigned to projects in the various divisions (Project Air Force, Arroyo Center, National Defense Research Institute, other domestic).	
Address:	1700 Main Street Santa Monica, CA 90407-2138	
Director:	Mr. Fred Timson, (310) 393-0411, ext. 7802	
Size:	Professional:	11
	Support:	0
	Consultants:	0
	Subcontractors:	0
Focus:	Force Costing, O&S Costing, System Costing, Space Systems	
Activity:	Number of projects in process:	3
	Average duration of a project:	1-2 year
	Average number of staff members assigned to a project:	1-3
	Average number of staff-years expended per project:	0.5 to 4
	Percentage of effort conducted by consultants:	0%
	Percentage of effort conducted by subcontractors:	0%

RAND-1

Title:	Force Structure and Support Infrastructure Costing for Program Analysis and Evaluation		
Summary:	The objective of this research is to design, develop, and implement an automated system for costing force structure and related changes in defense programs. The project includes recommendations for developing a centralized database within PA&E to support the costing system		
Classification:	Unclassified		
Sponsor:	OD(PA&E)		
Performer:	RAND		
	Adele Palmer, (310) 393-0411 (Co-PI); Jim Bigelow, (310) 393-0411 (Co-PI); Manuel Carrillo, (310) 393-0411; Gary Massey, (310) 393-0411		
Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
Schedule:	<u>Start</u>	<u>End</u>	
	Dec 90	Sep 98	
Data Base:	Title:		
	Description:		
	Automation:		
Publications:	The Force Structure Costing Project: An Introductory Briefing, WD-5252-PA&E, Adele Palmer, December 1990, Unclassified (distribution of RAND WDs controlled by sponsor)		

Keywords: Government, Estimating, Analysis, Programming, Forces, Expert System, Method, Computer Model

Data Base:	Title:	Defense System Cost Performance Database
	Description:	Cost growth histories and assorted program data on 244 weapon systems through December 1994
	Automation:	PC (Excel)
Publications:	<i>The Defense System Cost Performance Database: Cost Growth Analysis Using SARs</i> , MR-625-OSD, Jarvaise, Drezner, Norton, 1996, Unclassified	
Keywords:	Government, Analysis, Risk/Uncertainty, Data Collection, Data Base, Study	

CNA Corporation (CNA)

Name:	CNA Corporation, Cost and Acquisition Team		
Address:	4401 Ford Avenue, Alexandria, VA 22302		
Director:	Dr. Matthew S. Goldberg, (703) 824-2455		
Size:	Professional:	6	
	Support:	1	
	Consultants:	4	
	Subcontractors:	1	
Focus:			
Activity:	Number of projects in process:	7	
	Average duration of a project:	1.25 years	
	Average number of staff members assigned to a project:	4	
	Average number of staff-years expended per project:	2	
	Percentage of effort conducted by consultants:	10%	
	Percentage of effort conducted by subcontractors:	5%	

CNA-1

Title: Restructuring DoN FYDP Program Elements

Summary: This project will revise the DoN (USN and USMC) program element structure to make it more useful in planning, programming, and budgeting. The revised structure will be applicable at all echelons of command, while enabling distinctions between forces and infrastructure. It should also be sufficiently flexible to accommodate both present and future force requirements, while guarding against overlaps in resources. Finally, it should provide information needed by both OSD and DoN to support decision-making and resource-allocation analysis, and it should satisfy certain other requirements defined by Navy and Marine Corps leadership.

Classification: Unclassified

Sponsor: DoN FYDP Improvement Project Office (N8)

Performer: CNA Corporation, Cost and Acquisition Team
Mr. Michael Dominguez, (703) 824-2420

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	00	\$320,000	1.3
	01	\$220,000	0.9

Schedule:	<u>Start</u>	<u>End</u>
	Mar 00	Apr 01

Data Base: **Title:** DoN Program Element Dictionary

Description:

Automation: Microsoft Access

Publications: None

Keywords: Government, Programming, Budgeting, Study

CNA-2

Title: Acquisition Management Analysis

Summary: This project is creating corporate profiles of the largest DoN contractors. The information contained in each profile will include the corporate organization, income statement, balance sheet, debt structure, major product lines, teaming and subcontracting arrangements, and foreign military sales. Each profile will also document the recent history in terms of stock market performance, debt issues and bond ratings, as well as other newsworthy event such as results of operational tests. The profiles will also list the DoN and other DoD programs on which the contractor is currently working, bidding, or expected to bid.

Classification: Unclassified

Sponsor: Assistant Secretary of the Navy, Research, Development and Acquisition

Performer: CNA Corporation, Cost and Acquisition Team
Dr. Matthew S. Goldberg, (703) 824-2455

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$225,000	0.9
01	\$300,000	1.2

Schedule:

<u>Start</u>	<u>End</u>
Apr 00	Sep 01

Data Base:

Title: Defense Contractor Corporate Profiles

Description:

Automation: TBD

Publications: None

Keywords: Industry, Acquisition Strategy, Database, Study

CNA-3

Title: Military Hospital Cost Analysis

Summary: This project will estimate functions to predict the annual operating costs as each CONUS military hospital. It will also develop a database that describes the beneficiary population in each catchment region. The cost functions and population data will be organized into a relational database to assist the sponsor in conducting "make-buy" analyses, comparing the cost-effectiveness of care produced at military hospitals with care purchased from civilian providers.

Classification: Unclassified

Sponsor: Office of the Secretary of Defense, Director, Program Analysis and Evaluation

Performer: CNA Corporation, Cost and Acquisition Team
Dr. Matthew S. Goldberg, (703) 824-2455

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$225,000	0.9
01	\$225,000	0.9

Schedule:

<u>Start</u>	<u>End</u>
Apr 00	Sep 01

Data Base:

Title: Military Hospital Cost, Workload and Population

Description:

Automation: Microsoft Access

Publications: None
Keywords: Economic Analysis, Cost/Production Functions, Statistics/Regression, Database, Study

CNA-4

Title: Economic Analysis of the Smart Card
Summary: The study is to assess the economic viability of Smart Card implementation in selected business functions at Great Lakes Naval Training Center; Naval Air Station, Pensacola; and Fleet Combat Training Center, Atlantic.
Classification: Unclassified
Sponsor: Department of the Navy, Smart Card Office
Performer: CNA Corporation, Cost and Acquisition Team
Mr. Jino Choi, (703) 824-2266
Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
98	\$56,000	0.25
99	\$70,000	0.4

Schedule:

<u>Start</u>	<u>End</u>
Jul 98	Jun 00

Data Base: **Title:**
Description:
Automation:
Publications: None
Keywords: Economic Analysis, Case Study, Demonstration/Validation, Advanced Technology, Automation, Software, Manpower/Personnel, Infrastructure

CNA-5

Title: Supply Readiness and Cost
Summary: This project covers various topics involving supply readiness. We are currently working on explaining the observed increases in the cost of aviation depot-level repair per flight hour.
Classification: Unclassified
Sponsor: Supply Programs and Policy Division, Office of the Chief of Naval Operations (N41)
Performer: CNA Corporation, Infrastructure and Readiness Team
Dr. Jim Jondrow, (703) 824-2261
Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
99	\$367,000	2.0
00	\$222,000	1.3

Schedule:

<u>Start</u>	<u>End</u>
Oct 98	July 00

Data Base: **Title:** Component net prices by NIIN
Description:
Automation: Microsoft Access and Excel
Publications: None
Keywords: Aircraft, Spares/Logistics, Operations and Support, Time Series

CNA-6

Title: Support for QDR 01: Strategy of Balance

Summary: This study attempts to quantify the tradeoff between current readiness and spending for the future. As part of this effort, we need to estimate the "bang per buck" of different kinds of spending on readiness, i.e., the cost of achieving extra readiness in these different ways.

Classification: Unclassified

Sponsor: Strategy and Policy Division, Office of the Chief of Naval Operations (N51)

Performer: CNA Corporation, Infrastructure and Readiness Team
Dr. Jim Jondrow, (703) 824-2261

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$143,000	about 1.0

Schedule:

<u>Start</u>	<u>End</u>
Jan 00	July 00

Data Base:

Title: No title yet

Description: Summarizes results from the readiness literature

Automation: Microsoft Access

Publications: None

Keywords: Readiness, Economic Analysis, Budgeting

CNA-7

Title: Assessing and Monitoring Utility Privatization

Summary: We are beginning to study the Navy's utility privatizations to date, in order to help assess their savings and costs and determine appropriate measurements and data requirements for future privatizations. We will also examine relevant data from the other Services and private industry to determine their monitoring procedures and their measurements of realized savings.

Classification: Unclassified

Sponsor: Facilities and Engineering Division, Office of the Chief of Naval Operations (N44)

Performer: CNA Corporation, Infrastructure and Readiness Team
Dr. Glenn Ackerman, (703) 824-2612

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$119,000	0.50
01	\$25,000	0.13

Schedule:

<u>Start</u>	<u>End</u>
Jan 00	Nov 00

Data Base: None

Publications: None

Keywords: Facilities, Infrastructure, Economic Analysis, Industry, Government

Institute for Defense Analyses (IDA)

Name:	Institute for Defense Analyses		
Address:	1801 N. Beauregard Street Alexandria, VA 22311-1772		
Director:	Dr. Stephen J. Balut, (703)845-2527, E-mail: sbalut@ida.org		
Size:	Professional:	45	
	Support:	4	
	Consultants:	40	
	Subcontractors:	1	
Focus:	Cost of Weapon Systems, Forces and Operation		
Activity:	Number of projects in process:	42	
	Average duration of a project:	1 year	
	Average number of staff members assigned to a project:	2-4	
	Average number of staff-years expended per project:	2	
	Percentage of effort conducted by consultants:	30%	
	Percentage of effort conducted by subcontractors:	2%	

IDA-1

Title: Assessment of CCDR System

Summary: The OSD Cost Analysis Improvement Group (CAIG) maintains an integrated cost research program to improve the technical capabilities of the DoD to estimate the costs of major equipment. The CAIG works with DoD components to determine relevant costs, collect and make available related actual costs, and develop techniques for projecting them. An important part of the CAIG charter is to develop and implement policy to provide for the appropriate collection, storage, and exchange of information concerning improved cost estimating procedures, methodology, and data necessary for cost estimating.

During the past several years, the CCDR Project Office (CCDR-PO) has led an ongoing joint DoD and industry effort to re-engineer CCDR policies and business rules to improve the quality, relevancy, and availability of actual cost data. Significant progress has been made in the release of CCDR Manual, which is now being updated. While much has been done several critical areas still need to be addressed such as changing or deleting report formats, identifying new ways to collect cost data on software projects, exploring alternative reporting approaches, and improving data quality and consistency.

Classification: Unclassified

Sponsor: OSD (PA&E)
WSCAD/CCDR-PO
Suite 500, CGN
Arlington VA

Mr. Thomas J. Coonce (703) 690-3169

Performer: IDA
Mr. John Cloos (703) 845-2506

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	FY98	\$220,000	
	FY99	\$250,000	

Schedule: Start End
 Oct 96 Jan 01

Data Base: Not applicable

Publications: None

Keywords: Government, Industry, Analysis, Labor, Material, Schedule, Study

IDA-2

Title: Economic Drivers of Defense Overhead Costs

Summary: The objective of this task is to identify the economic and regulatory factors that drive the overhead costs charged by defense firms. A theoretical model of overhead costs from an economic framework will be developed. The model will be used to analyze the relationship of economic factors and DoD regulations on contractor overhead costs under current business practices. The model will also assess how changes in DoD regulations impact the balance of economic forces.

Classification: Unclassified/Company Proprietary

Sponsor: OD(PA&E)
 The Pentagon, Rm. BE799
 Washington, DC 20301
 Mr. Gary Pennett, (703) 695-4348

Performer: IDA
 Dr. Thomas Frazier, (703) 845-2132

Resources: FY Dollars Staff-years
 95 \$250,000
 96 \$250,000
 00 \$175,000

Schedule: Start End
 Apr 95 Sep 01

Data Base: **Title:** IDA's Defense Contractor Overhead Data Base, Contractor Cost Data Reports
Description:
Automation: TBD

Publications: "Renegotiation of Fixed Price Contracts on the F-16 Program," IDA Paper P-3286, December 1996.

Keywords: Industry, Government, Estimating, Overhead/Indirect, Economic Analysis, Study

IDA-3

Title: Assessment of BMDO Cost Estimation Methodology and Cost Control/Cost Reduction Initiatives

Summary: Assess effect of cost control/reduction initiatives funded by BMDO, assess key cost estimation methodologies, and assist BMDO in development of joint cost methodology.

Classification: Unclassified

Sponsor: Ballistic Missile Defense Organization

Performer: IDA
 John Hiller, (703) 845-6783

Resources: FY Dollars Staff-years
 00 \$2400,000 2+

Schedule: Start End
 5/00 7/01

Data Base: Title:
 Description:
 Automation:

Publications:

Keywords: Government, Analysis, Missile, Life Cycle, Case Studies

IDA-4

Title: Methods to Assess Schedules for the Strategic Defense System

Summary: The objective of this task is to develop methods for assessing the acquisition schedules of ballistic missile defense systems. The systems include space-based surveillance and interceptor systems, surface-based interceptor systems, and other surface-based elements.

Classification: Unclassified

Sponsor: BMDO/PDE
 The Pentagon
 Washington, DC, 20301-7100
 Mr. Lowell Naef, (703) 604-0530

Performer: IDA
 Mr. Bruce Harmon, (703) 845-2510

Resources: FY Dollars Staff-years
 prior \$215,000 1.2
 00 No additional 0.2

Schedule: Start End
 Jan 91 Oct 00

Data Base: Title:
 Description: Schedule and characteristic data on 26 unmanned spacecraft, 22 missile, and 100 software programs.
 Automation: None

Publications: *Assessing Acquisition Schedules for Unmanned Spacecraft*, IDA Paper P-2766, April 1993.
 Schedule Assessment Methods for Surface-Launched Interceptors, IDA Paper P-3014, August 1995.

Keywords: Government, Schedule, Estimating, Method, Statistics/Regression, Space Systems, Missiles, EMD, Production, Software

IDA-5

Title: Costs of Developing and Producing Next Generation Tactical Aircraft

Summary: The objective of this task is to collect, analyze and exploit the latest available information to develop databases and methods for estimating the development and production costs of next generation fighter/attack aircraft..

Classification: Unclassified

Sponsor: OSD(PA&E)
 The Pentagon, Room BE779
 Washington, DC

Mr. Gary Pennett, (703)695-7282

Performer: IDA

Mr. Bruce Harmon, (703) 845-2510

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
prior	\$350,000	2.0
00	\$200,000	1.0

Schedule:

<u>Start</u>	<u>End</u>
Oct 98	Jun 01

Data Base: Title:

Description: Cost data at the level 4 WBS level for historical and ongoing combat aircraft programs.

Automation: Spreadsheets

Publications: None.

Keywords: Government, Estimating, Method, Statistics/Regression, Aircraft, EMD, Production, Software

IDA-6

Title: Cost of Stealth

Summary: The objective of this task is to estimate the cost of obtaining signature reduction for tactical aircraft through (1) adaptation of experiences gained by accomplished programs; and (2) technologies that will contribute to reductions in cost or signature in the future.

Classification: Top Secret/Proprietary Information/Special Access

Sponsor: USD(A&T)
S&TS/AW
The Pentagon, Rm. 3E1081
Washington, DC 20301
Mr. Mutzelburg, (703) 695-0525

Performer: IDA
Dr. J. R. Nelson, (703) 845-2571

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
Prior	\$525,000	2.6
99	\$185,000	0.9
00	\$125,000	0.6

Schedule:

<u>Start</u>	<u>End</u>
Oct 96	Continuing

Data Base: None

Publications: Draft Paper for security and technology review in May 2000.

Keywords: Government, Estimating, Analysis, Aircraft, EMD, Production, Operations and Support, Schedule, Data Collection, Data Base, Method

IDA-7

Title: Costs & Benefits of Installation of Flight Safety Systems on F-22 Aircraft

Summary: Investigate and assess the incremental life-cycle costs and benefits of potential flight safety-related investments for the F-22A aircraft.

Classification: Unclassified/Proprietary Information

Sponsor: USD(A&T)
S&TS/AW
The Pentagon, Rm. 3E1081
Washington, DC 20301
Mr. Dean Gissendanner, (703) 695-7036

Performer: IDA
Dr. J. R. Nelson, (703) 845-2571

Resources: FY Dollars Staff-years
99 \$395,000 2.0

Schedule: Start End
Jan 99 Nov 99

Data Base: None

Publications: "Costs and Benefits of the Installation of Certain Flight Safety Systems on the F-22A Aircraft," IDA Paper P-3487

Keywords: Government, Estimating, Analysis, Aircraft, EMD, Production, Operations and Support, Schedule, Data Collection, Data Base, Method

IDA-8

Title: Cost and Benefits of Raising the Micro-Purchasing Dollar Threshold

Summary: The objective of this task is to measure the costs and benefits of the proposal to raise the micro-purchase dollar threshold. The task will specifically include an assessment of the impact that any change in the threshold might have on small business.

Classification: Unclassified

Sponsor: Director, Small and Disadvantaged Business Utilization
1771 N Kent St.
Suite 9100
Arlington, VA 22006
Mr. Tim Foreman 703 588 8611

Performer: IDA
Dr. Maria Borga, (703) 845-2514

Resources: FY Dollars Staff-years
99 \$100,000 1

Schedule: Start End
Dec 98 Dec 00

Data Base: None

Publications: TBD

Keywords: Government, Estimating, Study

IDA-9

Title: Support to F-22A Aircraft Production Readiness Assessment

Summary: Support the F-22 DAB LRIP Production Readiness Assessment, which was originally scheduled for December, 1999, and is now scheduled for December, 2000. IDA effort includes analysis of the feasibility of the planned production and test schedules, including comparisons to historical programs. IDA is also providing an assessment of the program's general progress and current technical issues.

Classification: Unclassified Proprietary

Sponsor: DUSD(IA)/ICA
3300 Defense Pentagon (Room 3E1060)
Washington, DC 20301-3300
Mr. Martin Meth (703) 588-0189

Performer: IDA
Mr. James Woolsey, (703) 845-2133

Resources: FY Dollars Staff-years
99 150K 0.75
00 TBD

Schedule: Start End
Aug 99 Continuing

Data Base: N/A

Publications: TBD

Keywords: Scheduling

IDA-10

Title: Technical and Schedule Risk Assessments for Tactical Aircraft Programs

Summary: This task supports Air Warfare/Strategic and Tactical Systems in providing independent program assessments of technical and schedule risks for tactical aircraft and missiles to the OIPT (Overarching Integrated Product Team) for DAB milestone reviews. This is a continuing project.

Classification: Secret/Proprietary Information

Sponsor: USD(A&T), S&TS/AW
The Pentagon, Rm. 3E1081
Washington, DC 20301
Mr. Dean Gissendanner, (703) 695-7036

Performer: IDA
Dr. J. R. Nelson, (703) 845-2571

Resources: FY Dollars Staff-years
Prior \$500,000 2.8
99 \$75,000 0.4
00 \$35,000 0.2

Schedule: Start End
Feb 92 Continuing

Data Base: N/A

Publications: TBD

Keywords: Government, Analysis, Aircraft, EMD, Production, Schedule, Risk/Uncertainty, Data Collection, Data Base, Method

IDA-11

Title: Affordable Multi-Missile Manufacturing (AM3)

Summary: IDA will support DARPA/DoD evaluation of missile industry cost reduction initiatives to be submitted in the form of Integrated Portfolio Benefit Analyses. As part of this support, IDA will provide guidance to the industry teams related to analytical ground rules and methods. IDA will comment on the realism of the proposed savings and, where

appropriate, recommend adjustments. Summarized findings will be presented as a report, and will be used in the award of Phase III Factory Demonstrations.

Classification: Unclassified

Sponsor: Defense Advanced Research Projects Agency
3701 North Fairfax Drive
Arlington, VA 22203-1714
Dr. Bill Scherun, (703) 696-2224

Performer: IDA
Dr. Thomas P. Frazier, (703) 845-2132

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	96	\$200,000	1.25
	97	\$200,000	1.25
	98	\$325,000	2.25
	00	\$300,000	2.00

Schedule:	<u>Start</u>	<u>End</u>
	Nov 95	Sep 01

Data Base: None

Publications: TBD

Keywords: Industry, Estimating, Analysis, Missiles, EMD, Production, Operations and Support, Labor, Material, Overhead/Indirect, Engineering, Manufacturing, Acquisition Strategy, Automation, Integration, Data Collection, Mathematical Modeling, Statistics/Regression, Data Base, Review, CER, Study

IDA-12

Title: Portfolio Optimization Feasibility Study

Summary: This study began as an investigation of the feasibility of applying optimization technology for defense acquisition planning purposes. Initially we focused on exploring the feasibility of using optimization technology to develop a Master Production Schedule for approximately 80 ACAT1 systems. Beginning August 1999 the study progressed to development of an optimization system for the Master Production Schedule of 80 ACAT1 systems.

Classification: Unclassified

Sponsor: USD(A&T)
Dr. Nancy Spruill
Mr. Phil Rodgers (COTR)

Performer: IDA
Dr. Charles Weber (703) 845-6784

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	98	\$90,000	0.5
	99	\$450,000	2.4
	00	\$1,000,000	5.6

Schedule:	<u>Start</u>	<u>End</u>
	Jun 98	Continuing

Data Base: None

Publications: TBD

Keywords: Estimating, Weapon Systems, Production, Acquisition Strategy, Mathematical Modeling, Mathematical Model

IDA-13

Title: Resource Analysis for Operational Test and Evaluation (OT&E)

Summary: Conduct resource analysis to aid DOT&E in determining the adequacy of OT&E resources in the Services' Program Objective Memorandum and the Future Years Defense Program. Conduct analysis to support reporting in the Director of Operational Test and Evaluation (DOT&E) Annual Report to Congress and for developing resource related policy recommendations throughout the PPBS cycle.

Classification: Top Secret

Sponsor: Deputy Director, Operational Test and Evaluation, Resources and Ranges
The Pentagon, Room 3D1067
1700 Defense
Washington, DC 20301-1700
Mr. John F. Gehrig, (703) 697-5552

Performer: IDA
Mr. Thomas A. Musson, (703) 578-2729
Ms. Christine J. Crabill, (703) 578-2716

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
FY98	\$200,000	1.2
FY99	\$100,000	0.6
FY00	\$400,000	2.5

Schedule:

<u>Start</u>	<u>End</u>
Feb 98	Ongoing

Data Base:

Title: OT&E Resources

Description: Programmed and Budgeted Funds, Manpower

Automation: FoxPro, Excel spreadsheets

Publications: None

Keywords: Government, Analysis, Policy, Programming, Budgeting, Operational Test and Evaluation

IDA-14

Title: Resource Analysis for Test and Evaluation—MRTFB

Summary: Analysis of resources devoted to the Major Range and Test Facility Base to include operating cost, investment cost, and personnel resources. Analyses include cost comparisons of alternative approaches to developing test and evaluation capability and realigning workload within existing infrastructure. Evaluation will include identification of efficiencies in management, operations, and resource processing.

Classification: Top Secret

Sponsor: Deputy Director, Resources and Ranges (DOT&E/RR)
Director, Operational Test and Evaluation (DOT&E)
The Pentagon, Rm. 3D1067
Washington, DC 20301
Mr. John Gehrig, (703) 697-5552

Performer: IDA
Mr. Dennis O. Madl, (703) 578-2718

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$2,300,000	13

Schedule: Start End
 Oct 99 Jan 01

Data Base: **Title:** T&E Resources
 Description: Operating Cost, Investment Projects, Real Property
 Automation: Hard copy, floppies or hard disk

Publications: "Relocating Jefferson Proving Ground Activities to Yuma Proving Ground," IDA Paper P-2413, August 1990.
 "Cost Comparison of the Navy's Air Combat Environment Test and Evaluation Facility (ACETEF) and the Air Force's Electronic Combat Integrated Test (ECIT)," IDA Paper P-2727, June 1992.
 "The Need for Unexploded Ordnance Remediation Technology," IDA Document D-1527, October 1992.
 "Test and Evaluation Reliance--An Assessment," IDA Document D-1829, June 1996.

Keywords: Government, Analysis, Policy, Programming, Budgeting, Infrastructure, EMD, Test and Evaluation, Operations and Support, Acquisition Strategy, Labor, Overhead/Indirect, Economic Analysis, Study, Data Base

IDA-15

Title: Contingency Operations Support Tool (COST)

Summary: The initial estimates of the cost to support military operations in Bosnia (Operation Joint Endeavor (OJE)) proved to be significantly low. The DoD Deployment Model, used to estimate these costs, had been successfully used to estimate costs for other contingency operations in Haiti and Somalia. Cost estimates derived in this manner for the Bosnia operations were in error by more than a factor of two. The first phase of this task examined the initial and subsequent estimates in an attempt to understand why the estimates erred by this amount. Problems were observed in three areas: (1) estimating; (2) operations or policy changes; and (3) not estimated. In this phase of the task, IDA will develop the Contingency Operation Support Tool (COST) for the OSD Comptroller to aid the analyst in the preparation of both planning and detailed estimates for future contingencies. A standard cost breakdown structure has now been approved and will be used for estimating and reporting costs for contingency operations. A logical data model was developed and a physical model implemented to facilitate the construction of an estimate. COST is being developed using COTS. The initial concept of operation called for the application and its data available to approved users via the SIPRNet. Initial or planning estimates will be prepared by the OSD (C) and passed to the Services and Agencies where a more detailed estimate can be made. Service and Agency estimates will be passed to OUSD(C) for inclusion in the official estimate for the contingency. Trial periods will be established to verify model operations. A task goal is to secure the endorsement by the OUSD(C), Joint Staff, and Military Departments to use the application for cost estimates during all contingency operations.

Classification: Unclassified

Sponsor: OUSD (Comptroller)
 1800 Defense Pentagon
 The Pentagon, Rm. 3D868
 Washington, DC 20301-1800
 Ms. Ann Reese, (703) 697-9317, ext. 19

Performer: IDA
 Mr. Paul Goree, (703) 845-2238

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
97	\$450,000	2.7
98	\$700,000	4.1
99	\$850,000	4.5
00	\$350,000	1.8

Schedule:

<u>Start</u>	<u>End</u>
Dec 97	Oct 00

Data Base:

Title: COST

Description: The COST database is comprised of separate physical databases entitled Cost Systems, Cost Factors and Cost Standards, and Cost Contingencies.

Automation: Design will use COTS and desktop computers, possibly using Web technology.

Publications: A users guide has been prepared and model documentation will accompany the delivery of the final model.

Keywords: Government, Estimating, Forces, Life Cycle, Computer Model, CER

IDA-16

Title: FYDP Related Studies

Summary: This task supports the conduct of studies to improve the existing FYDP-related taxonomy of missions and infrastructure, to normalize prior years data for funding policy changes, and to maintain and utilize previously developed models for FYDP-related analyses.

Classification: Secret

Sponsor: OD(PA&E), Force and Infrastructure Cost Analysis Division
The Pentagon, Rm. 2D278
Washington, DC 20301
Mr. Lance Roark, (703) 697-4311

Performer: IDA
Mr. Ronald E. Porten, (703) 845-2145

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
92	\$ 40,000	0.3
93	\$220,000	2.4
95	\$130,000	1.0
96	\$150,000	1.2
99	\$250,000	1.5
00	\$87,000	

Schedule:

<u>Start</u>	<u>End</u>
Sep 92	Oct 01

Data Base:

Title: AMORD, FYDP, FYDP Normalization, FACS, and Force and Infrastructure Categories

Description: FYDP type data for all DoD programs to include Defense Mission Categories, Program Element

Automation: FACS Model Updates

Publications: IDA Paper P-3194-- Normalizing the Future Years Defense Program for Funding Policy Changes (Update Currently in Progress)

Keywords: Government, Programming, Forces, Mathematical Modeling, Computer Model

IDA-17

Title: Defense Resource Management Cost Model

Summary: Develop a computer model that permits small^{capital}—to medium-size countries to estimate the funding requirements of alternative, multi-year force compositions. The model provides cost estimates that are sensitive to the numbers and types of combat and support units; numbers and types of equipment; unit manning; peacetime training levels (OPTEMPO); equipment modernization; and WRM inventory changes. Users have convenient access to all characteristics of the model so they can adjust the model's use to their own practices. The model can be tailored to use the currencies, cost accounts, personnel classifications, and a wide variety of force and equipment configurations of any military force. Cost estimating features of the model provide the ability to estimate the direct and indirect personnel costs, fixed and variable operating costs, and multi-year procurement funding. Effort includes travel to foreign countries to implement the model as part of the Partnerships for Peace program.

Classification: Unclassified

Sponsor: OD(PA&E), Regional Assessment and Modeling Division
The Pentagon, Rm. 2C270
Washington, DC 20301
COL Gary Morgan, (703) 697-6415

Performer: IDA
Mr. James L. Wilson, (703) 845-2469

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	93	\$25,000	0.2
	94	\$288,000	1.9
	95	\$550,000	3.5
	96	\$1,000,000	6.8
	97	\$1,000,000	6.8
	98	\$1,100,000	6.9
	99	\$1,200,000	7.0
	00	\$1,200,000	7.0

Schedule:	<u>Start</u>	<u>End</u>
	Sep 93	Indefinite

Data Base: None

Publications: DRMM Cost Modules Users Manual

Keywords: Government, Programming, Forces, Life Cycle, Fixed Costs, Variable Costs, Mathematical Modeling, Computer Model

IDA-18

Title: Major Defense Acquisition Program (MDAP) Analysis and FYDP Support

Summary: This objective of this task is to investigate ways to improve the effectiveness of OUSD(A&T) participation in the PPBS process. The goal of this task is to provide more accurate and timely MDAP funding data to the acquisition community. This task will improve the process by which the acquisition community is made aware of funding information that is vital to the decision making process. It will assist the Under Secretary of Defense for Acquisition and Technology in his primary responsibilities to safeguard acquisition investment resources.

Classification: Secret

Sponsor: OUSD(A&T)/API/AR
The Pentagon, Rm. 3D765
Washington, DC 20301
Mr. Steve Dratter, (703) 697-8020

Performer: IDA
Mr. David A. Drake, (703) 845-2573

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
99	\$75,000	0.6
00	\$50,000	0.4

Schedule:

<u>Start</u>	<u>End</u>
Jan 99	Sep 00

Data Base:

Title: MDAPs

Description: FYDP type data for all DoD RDT&E and Procurement programs to include Defense Mission Categories, Program Element, Procurement Annex Line Item, MDAP Identifier, and OSD OPRs.

Automation: FoxPro, dBASE

Publications: TBD

Keywords: Government, Programming, Forces, Acquisition Strategy, Operations and Support, Mathematical Modeling, Statistics/Regression, Computer Model

IDA-19

Title: Defense Economic Planning and Projection Systems (DEPPS)

Summary: Maintain the currency of the Defense Translator within DEPPS by periodically updating the various sections of the translator associated with the appropriations accounts. The Defense Translator accounts for the distribution of defense spending among the industries producing the goods and services that DoD buys, and describes the commodity composition of defense demands.

Classification: Unclassified

Sponsor: OD(PA&E)/RA/EARPD
The Pentagon, Rm. BE798
Washington, DC 20301
Mr. Ron Lile, (703) 614-3840

Performer: IDA
Dr. Thomas Frazier, (703) 845-2132

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
85	\$122,000	1.0
87	\$182,000	1.5
88	\$40,000	0.3
90	\$75,000	0.6
92	\$60,000	0.5
93	\$80,000	0.7
94	\$160,000	1.1
97	\$30,000	0.2
98	\$30,000	0.2
99	\$30,000	0.2
00	\$30,000	0.2

Schedule:

<u>Start</u>	<u>End</u>
Jul 85	Dec 01

Data Base: None

Publications: "A Comparison of the DEIMS and the Department of Commerce Translator Vectors," IDA Paper P-2647, T. P. Frazier, S. K. Welman, and R. H. White, March 1993, Unclassified.

"A User's Manual for the Revised Defense Translator Model," IDA Document D-796, T. P. Frazier and J. B. Tate, June 1990, Unclassified.

"The Revised Defense Translator," IDA Paper P-2141, T. P. Frazier, C. G. Campbell, and R. T. Cheslow, October 1989, Unclassified.

Keywords: Industry, Government, Analysis, Budgeting, Mathematical Modeling, Economic Analysis, Study

IDA-20

Title: FYDP Improvement, Phase II

Summary: In August 1996, the Deputy Secretary of Defense directed that the responsibility for FYDP update, maintenance, and distribution be transferred from the Comptroller to PA&E. The transition of this FYDP responsibility was to be completed in time to produce the POM FYDP in August 1997 within PA&E. This transition was completed successfully and updates now occur routinely in significantly less time than before. Following this successful transition, Phase II will address systematic improvements to the FYDP data and structure. These changes are envisioned to be fundamental to the long term success of the Defense Programming Database initiative of integrating the FYDP and other defense data to better support the programming and budgeting processes of the department. The FYDP Improvement Phase II project will now focus on accomplishing a POM-less Program Review; will work toward rationalizing data used for program review with data used for budget review; and will strive to harmonize the view of data used by OSD with data native to the individual Services. IDA will:

1. Support PA&E for the continuing FYDP improvement, Phase II effort, with both technical and analytical support necessary to effect the new initiatives of
 - POM-less Program Review
 - Rationalizing Programming and Budget Data, and
 - Harmonizing OSD and Service program data.
2. In support of POM-less Program Review, recommend changes to the Service and Agency data submissions processed by FUSE to update the FYDP. These changes are expected to reduce the data that are requested by the POM Preparation Instructions (PPI) and are collected through the Advanced POM Preparation System (APPS). Suggestions for modification to the data registry and data update systems will be made as appropriate.
3. In support of the task to "Rationalize Program and Budget Data" assist the established working groups to analyze and compare the data displays and requirements of the PPI, FYDP and the FMR. Recommendations will be made for modifying the collection processes to minimize the redundancy caused by separate submissions. In some cases it is expected that the data request will be modified to include a lower level of detail for one requirement in order to satisfy multiple user requirements with a single data call.
4. Provide the analytical support to PA&E for its initiative to "Harmonize OSD and Service data." The analysis will examine the data requirements of the DPD and relate those requirements to the Service native databases. The goal will be to meet the data requirements of the DPD without placing requirements on the Services to conform to the exact data structure of the DPD. The work will be accomplished in close coordination with the data standardization effort.

5. Make recommendations to improve data standardization across the DPD user community. Analyses will be performed to determine the level of data necessary, (e.g., "budget activity" and "elements of expense") to improve the analytical potential for the user community. Recommendations for modifications and enhancements to the data registry system for standard use throughout the DoD community will be made.

A DoD task force and the sponsor will approve products prior to implementation.

Classification: Unclassified work dealing with a classified database

Sponsor: OD(PA&E)
1800 Defense Pentagon
The Pentagon, Rm. 2C282
Washington, DC 20301-1800
Dr. Bryan Jack, (703) 693-7827

Performer: IDA
Mr. Paul Goree, (703) 845-2238

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	99	\$400,000	2.1

Schedule:	<u>Start</u>	<u>End</u>
	Aug 99	Oct 00

Data Base: *Title:*
Description:
Automation: FYDP, APPS, DPD, MDAP

Publications: TBD

Keywords: Government, Programming, Forces, Infrastructure, Manpower/Personnel, Life Cycle, Automation, Data Collection, Data Base

IDA-21

Title: Force Modernization Metrics

Summary: In building the Defense Program Projection, which looks at prospective defense spending twelve years beyond the end of the FYDP, tools are needed to present ways in which the force will be evolving. Building such tools is the central job of this task. In addition to tracking force age and capital asset value, attention will be devoted to developing indicators of capability for various missions and classes of systems to allow projections of capability to be made for alternative defense programs. The recapitalization of defense facilities will also be addressed.

Classification: Secret

Sponsor: Deputy Director (General Purpose Programs) Program Analysis and Evaluation
The Pentagon, Rm. 2E330
Washington, DC 20301
Mr. Will Jarvis, (703) 697-9132

Performer: IDA
Mr. Stanley A. Horowitz, (703) 845-2450

Resources:	<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
	97	\$340,000	2.2
	98	\$360,000	2.3
	99	\$175,000	1.1
	00	\$158,000	1.0

Schedule: Start End ...
 Oct 96 Dec 01

Data Base: Equipment inventories over time and potential capability measures. Age and plant replacement value of facilities by type and location.

Publications: TBD

Keywords: Government, Analysis, Review, Policy, Programming, Forces, Life Cycle, Data Collection, Time Series, Data Base, Computer Model, Study

IDA-22

Title: O&M Program Balance

Summary: This project is designed to develop cost estimating relationships that can be used the gauge the adequacy of Military Service and Defense Agency funding for operations and maintenance. One aspect of the work will be to determine the kinds of data that are needed to develop and the models that will represent the relationships between operations and maintenance funding and key parameters.

Classification: Unclassified

Sponsor: Director, Program Analysis and Evaluation
 The Pentagon, Rm. 3E836
 Washington, DC 20301
 Dr. Krystyna M. A. Kolesar, (703) 697-0222

Performer: IDA
 Mr. Stanley A. Horowitz, (703) 845-2450

Resources: FY Dollars Staff-years
 00 \$230,000 1.5

Schedule: Start End
 Sept 99 Dec 01

Data Base: TBD

Publications: TBD

Keywords: Government, Analysis, Policy, Programming, Data Collection, Data Base, Study

IDA-23

Title: Active/Reserve Integration

Summary: This work is designed to examine alternative ways to integrate active and reserve forces, particularly in the Army. For Army National Guard combat units, a key aspect of successful integration is being able to mobilize, train, and deploy for combat fast enough to effectively carry out its combat mission. The project has examined how long it would take Guard brigades and divisions to deploy. In addition it is looking at how best to provide command and staff training for National Guard combat units and the use of the Reserve Components to help shape the international environment.

Classification: Unclassified

Sponsor: Assistant Secretary of Defense (Reserve Affairs)
 The Pentagon, Rm. 2E515
 Washington, DC 20301
 Ms. Karen McKinney, (703) 697-4223

Performer: IDA
 Mr. Stanley A. Horowitz, (703) 845-2450

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
96	\$175,000	1.0
97	\$250,000	1.4
98	\$300,000	1.6
99	\$300,000	1.6
00	\$ 50,000	0.3

Schedule:

<u>Start</u>	<u>End</u>
Jan 96	Dec 01

Data Base:

Title: 49th Division Mobilization Plan

Description: Plan for mobilization, training, and deployment of a National Guard armored division.

Automation: Microcomputer zip drive

Publications:

"Conference on Force Integration: Seeking Better Reserve Component Capability and Credibility, Institute for Defense Analyses", Document D-1849, May 1996.

"Detachment 1, 28th Infantry Division Artillery in Bosnia", Document D-2083, Institute for Defense Analyses, December 1997.

"An Assessment of the Role of the Reserve Component in Military Transformation," Office of the Assistant Secretary of Defense (Reserve Affairs), April 2000.

Keywords: Government, Analysis, Policy, Manpower/Personnel, Readiness, Data Collection, Data Base, Study

IDA-24

Title: Workload Forecasting for the Veterans Benefits Administration

Summary: The objective of this task is to forecast the number of veterans who will apply or reapply for VA disability compensation benefits over a five-year horizon. Veterans are eligible for these benefits if they are disabled due to injury suffered or disease contracted while serving in the military. The forecasts will be used to determine the administrative staff required to adjudicate and process VA compensation claims.

Classification: Unclassified

Sponsor: Veterans Benefits Administration
Mr. Robert Haas, (202) 273-7041

Performer: IDA
Dr. David E. Hunter, (703) 845-2549

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
98	\$300,000	2.0
99	\$150,000	1.0
00	\$150,000	1.0

Schedule:

<u>Start</u>	<u>End</u>
Sep 98	Jun 00

Data Base:

Title: Compensation Workload Forecasting Model

Description: Demographic data on the actual veteran population; projections of the veteran population for five future years; and factors for disability claim submission rates within demographic cells

Automation: Visual Basic interface with Microsoft Access database

Publications: Final report due at end of project

Keywords: Government; Budgeting; Infrastructure; Data Collection, Mathematical Modeling; Data Base, Computer Model

IDA-25

Title: Evaluation of TRICARE Program Costs

Summary: The DoD has implemented a congressionally mandated uniform health care benefit, including an HMO option, for beneficiaries eligible for military health care. This new program, called TRICARE, is designed to improve the access to and quality of health care, while not increasing costs to either the government or covered beneficiaries. The objectives of this task are: (1) to compare the costs, both to the government and to covered beneficiaries, of the TRICARE program with those of the traditional benefit of direct care and CHAMPUS; and (2) determine the impact of TRICARE on the out-of-pocket expenses of military retirees. IDA has been conducting an ongoing evaluation of the TRICARE program, which is administered on a regional basis. Last year's evaluation covered seven health service regions which had been under TRICARE for at least one full year in FY 1997. This year's study extends the evaluation to eight health service regions, covering FY 1998 TRICARE experience.

Classification: Unclassified

Sponsor: TRICARE Management Activity (HPA&E)
5201 Leesburg Pike
Suite 1511
Falls Church, VA 22041
Lt. Col. Thomas Williams, (703) 681-4257

Performer: IDA
Dr. Philip M. Lurie, (703) 845-2118

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
99	\$414,000	1.9
00	\$880,000	4.0

Schedule:

<u>Start</u>	<u>End</u>
Oct 99	Sep 00

Data Base: None

Publications: None

Keywords: Government, Analysis, Policy, Infrastructure, Manpower/Personnel, Test and Evaluation, Variable Costs, Data Collection, Survey, Mathematical Modeling, Economic Analysis, Data Base, Study

IDA-26

Title: Reducing Defense Infrastructure Costs

Summary: This project is designed to find better strategies for managing infrastructure, and thus reducing infrastructure costs. The initial focus is on installation support costs. Service initiatives for developing benchmarks involving the costs and output of different installation support services are being examined. Private sector and other governmental practices are also being studied. The goal is to recommend adoption of an information system and a set of metrics that will allow decision-makers more insight into how to provide the needed installation support at a reduced cost. In addition the project is investigating the nature of quantitative relationships between force structure changes and spending on various portions of the defense infrastructure.

Classification: Unclassified

Sponsor: Director, Program Analysis and Evaluation
The Pentagon, Rm. BE798
Washington, DC 20301

LTC Keith Casperson, (703) 697-4311

Performer: IDA
Mr. Stanley A. Horowitz, (703) 845-2450

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
98	\$600,000	3.2
99	\$300,000	1.6
00	\$300,000	1.6

Schedule:

<u>Start</u>	<u>End</u>
Feb 98	Dec 01

Data Base: TBD

Publications: TBD

Keywords: Government, Analysis, Policy, Infrastructure, Facilities, Overhead/Indirect, Data Collection, Cost/Production Function, Study

IDA-27

Title: Management Headquarters Analysis

Summary: This project is designed to help DoD respond to the requirements of the FY 2000 National Defense Authorization Act regarding the documentation and evaluation of management headquarters activity

Classification: Unclassified

Sponsor: Director, Program Analysis and Evaluation
The Pentagon, Rm. 3E836
Washington, DC 20301
Mr. Bart Rhoades, (703) 695-4281

Performer: IDA
Mr. Stanley A. Horowitz, (703) 845-2450

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
00	\$300,000	1.8

Schedule:

<u>Start</u>	<u>End</u>
Nov 99	Dec 01

Data Base: TBD

Publications: TBD

Keywords: Government, Analysis, Policy, Management, Data Collection, Data Base, Study

IDA-28

Title: Military Hospital Cost Analysis Management

Summary: The purpose of the task is to estimate military hospital cost functions.

Classification: Unclassified

Sponsor: Paul Dickens, OSD, PA&E, Economic Analysis and Research

Performer: IDA
Dr. Lawrence Goldberg

Resources:

<u>FY</u>	<u>Dollars</u>	<u>Staff-years</u>
2000	97,500	0.5

Schedule:

<u>Start</u>	<u>End</u>

Oct 99 Unknown
Data Base: None
Publications: None
Keywords: Government, Estimating, Infrastructure, Operations and Support, Economic Analysis

IDA-29

Title: DSCA Business Metrics
Summary: The objective of this task is identify and quantify the business process steps being followed in each Service during FMS administration and to relate those efforts to the types of cases being managed. The ultimate goal is to provide the DSCA Comptroller with a way of quantifying the cost of administering each case and of performing additional functions that are not in support of specific cases (such as price and availability quotations). A preliminary objective is to learn more about Service operations by facilitating meetings with Service representatives where approaches to identifying and measuring business process metrics can be designed.
Classification: Unclassified
Sponsor: Defense Security Assistance Agency
 DSAA Comptroller
 Mr. Bill Johnson, (703) 604-6586
Performer: IDA
 Dr. Thomas P. Frazier, (703) 845-2132
Resources: FY Dollars Staff-years
 97 \$300,00 2
Schedule: Start End
 Jul 99 Oct 00
Data Base: None
Publications: TBD
Keywords: Government, Estimating, Automation, Software, Study

- [1] DoD Directive 5000.2-R, "Mandatory Procedures for MDAPs and MAIS Acquisition Programs," 11 May 1999.
- [2] Stephen J. Balut and Kathryn L. Wilson, "The IDA Cost Research Symposium," Institute for Defense Analyses, Document D-647, August 1989.
- [3] Stephen J. Balut and Kathryn L. Wilson, "1990 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-828, August 1990.
- [4] Stephen J. Balut and Kathryn L. Wilson, "The 1991 Cost Research Symposium," Institute for Defense Analyses, Document D-1003, July 1991.
- [5] Stephen J. Balut, "The 1992 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-1204, August 1992.
- [6] Stephen J. Balut, "The 1993 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-1414, August 1993.
- [7] Stephen J. Balut, "The 1994 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-1569, August 1994.
- [8] Stephen J. Balut, "The 1995 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-1754, August 1995.
- [9] Stephen J. Balut, "The 1996 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-1863, August 1996.
- [10] Stephen J. Balut, "The 1997 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-2025, July 1997.
- [11] Stephen J. Balut, "The 1998 IDA Cost Research Symposium," Institute for Defense Analyses, Document D-2173, August 1998.
- [12] Stephen J. Balut and Matthew Schaffer, "Defense Cost Research Projects and Plans, 1999," Institute for Defense Analyses, Document D-2345, August 1998.
- [13] Stephen J. Balut, Vance Gordon, Deborah Cann, Richard Bishop, and Richard Collins, "Status of DoD's Capability to Estimate the Costs of Weapon Systems: 1999 Update," Institute for Defense Analyses, Document D-2300, April 1999.

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